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EDITORIAL.

Rubber on Small Holdings

In visualising the future of the rubber planting industry in Malaya, the area planted on small holdings is of very great importance and any information concerning its distribution, yields, and field conditions constitutes most valuable data.

Statistics concerning such areas have improved in recent years, while mainly through the organisation of the Field Branch of the Department of Agriculture, S.S. and F.M.S., our information on the internal economy and the condition of such holdings has accumulated.

There has been a very wide-spread idea that the yields from small rubber holdings are almost bound to decline in future years. The basis for such belief is in the close planting commonly practised; neglect of weeding, drainage and other cultural methods usual on estates; disregard of the diseases which attack the trees; and lastly, wounding of the trees through bad tapping.

Estate practice has, in the past, been at wide variance with the customary methods obtaining on small holdings, but in spite of these differences, which are not so wide as formerly, the yields of rubber from small holdings in Malaya compare favourably with those from large estates.

The questions which concerns us are whether the native producer, in his anxiety to obtain a large crop, is removing bark at too great a rate, so that in future he will find himself without sufficient renewed bark to allow of tapping without resting the trees; whether by deep and careless tapping he is causing premanent injury to the tree; and whether neglect of mouldy rot disease of the tapping panel is so serious as to ruin the trees completely.

The uncertainty which existed concerning these questions led the Rubber Growers' Association in 1930, to approach the Malayan Committee of that body with the suggestion that it was desirable that steps should be taken to inaugurate a series of organised observations of sufficiently wide scope to yield reliable information.

Discussions followed in which the local Committee of the Rubber Growers' Association, the Department of Agriculture and the Rubber Research Institute of Malaya were concerned.

It was eventually agreed that the most effective and efficient manner for performing the work would be to make use of the existing Field Branch of the

Department of Agriculture with additional staff for the taking and compilation of the records and the general supervision of the work.

Discussion with the local Committee of the Rubber Growers' Association resulted early in 1931 in the provision of a grant of \$10,000 by the Rubber Research and Propaganda Committee, F.M.S. to enable the work to be undertaken.

Operations were therefore commenced in July of that year when Mr. H. D. Meads was selected to fill the post of recorder in charge of the observations. The actual measurements were completed in the early part of 1933 and the work of computing and collating the large mass of statistics connected with it, by July 1933.

The work has been carried on throughout in close consultation and collaboration with members of the scientific staff of the Rubber Research Institute and in particular with Mr. C. E. T. Mann of that Institute and with the Research, Field and Economics staff of the Department of Agriculture.

In a recently published Special Bulletin of the Department of Agriculture,* Mr. H. D. Meads reports in detail the results of this survey.

Based on the known figures for the State of Johore and on the standard production figures for the last year of restriction (1928), it is probable that of the total area of rubber in Malaya 60 per cent. or 1,879,600 acres is contained on estates of 100 acres and over, 10 per cent. or 313,300 acres on estates of between 25 and 100 acres and the remainder—30 per cent. or 939,800 acres in small holdings of under 25 acres each.

These figures are important because field observations indicate that the quality of the tapping and the consequent bark renewal on estates of between 25—100 acres is equal to that on estates of 100 acres and over. It follows, therefore, that the Report in question concerns 30 per cent. of the total area, or nearly 1,000,000 acres of rubber, in Malaya.

The problems dealt with are two-fold: the rate of bark consumption, and quality of bark renewal.

The investigation shews that the rate of bark consumption on small holdings is nearly 5 inches a year, on the entire circumference of the tree, (4.92 inches is the actual figure).

This allows over 7 years for bark renewal, supposing all tapping not to exceed a height of 6 feet and that tapping is carried out daily throughout this period. It has to be remembered that tapping above this height may be resorted to if circumstances dictate such a course.

Bark renewal depends on the general health of the tree, the quality of the tapping and the incidence of mouldy rot disease.

Systems of planting and cultural methods are not the most important factors in normal bark renewal. On the other hand, bad tapping, causing wounds, results in great irregularity of the surface and is frequently a cause of em-

* Bark Consumption and Bark Reserves on Small Rubber Holdings in Malaya by H. D. Meads. Special Bulletin, Economic Series No. 4, Department of Agriculture, Kuala Lumpur, S.S. and F.M.S., 44 pages, 8 full page illustrations. Price 50 cents (Straits) post free.

barrassment to the tapper when the time comes to tap on renewed bark. In this event the tapper has two alternatives: *viz*, to open tapping on a new panel above six feet, thus allowing extra time for bark renewal, or to give the tree a resting period. The latter course is frequently followed and is rendered possible by the fact that a large number of trees per acre are planted.

There remains, however, one important potential limiting factor on small holdings—the incidence of mouldy rot disease. If measures are not taken to check the disease the bark is destroyed down to the wood. In this way, therefore, there may be grave danger to the future utility of the tree. In earlier days, when treatment of the disease on small holdings was less general than is now the case, the disease was frequently present for a considerable time without treatment and whole sides of many of the trees were without a vestige of renewed bark. Time, however, is a great healer, and we are informed that native areas which suffered from the disease 14 years ago are still normal producers of rubber.

Mr. Meads comments on the danger of mouldy rot disease. He states that even prolonged neglect of treatment of the disease will not necessarily result in rendering any large area of rubber on small holdings permanently unproductive. He adds that the areas in which treatment is entirely neglected are not believed to be very extensive and are likely to diminish rather than extend, owing to the action recently taken by the Department of Agriculture with the object of rendering easily available to small-holders, supplies of cheap disinfectant which is at least effective in checking the damage occasioned by the disease.

After reviewing the evidence presented by the author, supplemented by our own knowledge of the statistical position and observation over some 20 years in Malaya, we can but agree with the conclusions implied by Mr. Meads; that neither by reason of previous neglect nor present practice can it be expected that the production of rubber from small holdings will decline either in the near future or during the next decade.

Varieties of Tuba.

We are indebted to Mr. M. R. Henderson of the Botanic Gardens Department, Straits Settlements, for a contribution in this number on The Sources of "tuba" in the Malay

Peninsula.

Derris, or tuba root, is becoming increasingly widely recognised as an insecticide. Recent work in the Department of Agriculture, S.S. and F.M.S. and by investigators in other parts of the world, has elucidated many of the problems which hitherto have prevented a wider use being made of this product. The data supplied by Mr. Henderson deal with the appearance and characteristics of the varieties of tuba found in Malaya.

In view of the fact that the valuable toxic qualities of tuba vary with the variety, the key supplied by Mr. Henderson will be found of value not only to the investigator but to the planter and exporter.

**Chinese Market
Gardens.**

The operations of Chinese vegetable-growers are a familiar sight throughout Malaya. The care and knowledge expended by these industrious people is evidenced by the flourishing crops of many varieties of vegetables produced in these gardens.

Of late years this form of agriculture has increased in extent until today it plays a not unimportant part in the economy of this country. Particular interest attaches, therefore, to an account in this number on "Chinese Market Gardening" which describes the methods by which these striking results are obtained.

It must be admitted that the Chinese use methods which are not always in conformity with modern ideas on health. At the same time, the first step in overcoming this objection must be a complete understanding of the methods of cultivation at present practised; subsequently we can turn our attention to a consideration of means by which such objections may be overcome without injury to an important phase of agricultural development.

The Chinese system of vegetable growing relies on the inter-dependance of cultivation and pig-breeding—with side-lines as such as fish rearing; any one of these industries might fail alone, but worked together they have proved profitable to the Chinese.

An important point in connexion with this industry is that, in the majority of cases, the gardens are established on old worked-out tin-mining land. The natural fertility of such land is low, but the gardeners are able in a few years to bring this soil to a very high degree of fertility and so to effect a permanent improvement of the land.

Original Articles.

CHINESE MARKET GARDENING

BY

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Introduction.

It is a recognised fact that the Chinese are probably the most skilful market gardeners in the world, and that the Western races, in spite of their progress in modern scientific agriculture, can still learn a considerable amount from them.

With this in view, the Department of Agriculture, on the opening of the new Agricultural Station at Cheras near Kuala Lumpur, decided to lay out a portion of the area as a model Chinese market garden. The garden is under the control of the Chinese sub-Inspector of Agriculture, who being trained in western methods of agriculture as well as in his own, has been able to combine the best points of each.

The following notes have been compiled as the result of observations made on the Station and during visits to other Chinese gardens.

Choice of Garden Site.

In the opinion of the Chinese gardeners, the ideal site for a market garden is a piece of flat, rather low-lying land, if possible near to a small stream in order to give facilities for watering and irrigation. Although the land should be low-lying, the soil must be well drained, and hence should contain a fair percentage of sand.

Tools.

The only implement used for cultivation is a digging implement known as a *changkol*. A heavy 5 lb. *changkol* fitted to a handle 5 ft. 6 in. long is used for digging and a lighter 3-4 lb. blade fitted on a 4 ft. 6 in. long handle for weeding. The *changkol* used for weeding has a wider blade than that for digging purposes.

For watering, large wooden tubs fitted with a bamboo or corrugated iron spout are used. Each tub is fitted with two handles through which a rotan is passed, forming a loop some 3 feet high. This serves as a handle for carrying purpose; the usual method of carrying is by means of a *kanda* stick passed through the loops of two such tubs, and supported across the shoulders of the worker.

For applying liquid manures, a small ladle, generally made of galvanised iron and fitted with a handle some 4 to 5 feet long, is used. Each ladle holds about $\frac{1}{2}$ gallon of liquid.

The only other implements that will be seen are baskets of various shapes and sizes which are used for such purposes as collecting the crops and carrying manures.

Coarse organic matter such as *lalang* and other grass is always carried by means of a *kanda* stick and a sling made of bamboo.

Formation of a New Garden.

The land is first cleared by slashing and burning the secondary jungle growth and heavy *lalang* grass (*Imperata arundinacea*). The land is then dug with a *changkol* to a depth of 1 to 2 feet, being left as rough as possible to facilitate the drying out of *lalang* roots. This process is repeated two or three times until practically all *lalang* has been destroyed. A final digging is then given and the *lalang* roots and any tree stumps are removed by hand, collected into heaps and burnt.

Preparation of Beds.

After the land has been cleared, the soil is then formed into a series of ridges or raised beds some $1\frac{1}{2}$ to 2 feet high on which the crops are grown.

The ridges on fairly flat land are straight, but those on hilly land are often V or S shaped, in order to retard soil wash, but in either case, the ridges are equally spaced and parallel.

The ridges after being lightly dug are considered fit for planting.

Preparation of Nursery Beds.

The site of the nursery is always carefully chosen—a rich piece of soil close to an ample water supply being selected. If there is no water supply close to an otherwise suitable portion of land, a pond is generally dug which in many cases is also used as a fish pond. The nursery site is first very carefully dug over—all roots being removed by hand. Manure, generally pig-manure, grass or other organic matter is incorporated into the soil, which is worked up to form a broad flat consolidated bed with a very fine surface tilth.

The average width of a nursery bed is about 4 feet, while the length varies from 20 to 30 feet.

Sowing.

Small seeds, such as chillies and brinjals, are always sown in nurseries, while the larger seeds, such as cucumber and ladies' finger, are sown direct in the field.

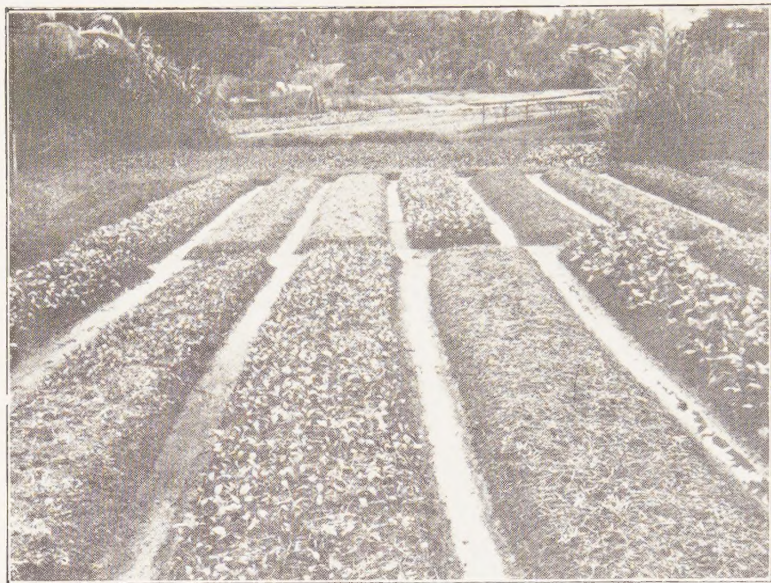


Method of making up new beds by splitting old ones down the centre and dragging soil to each side.



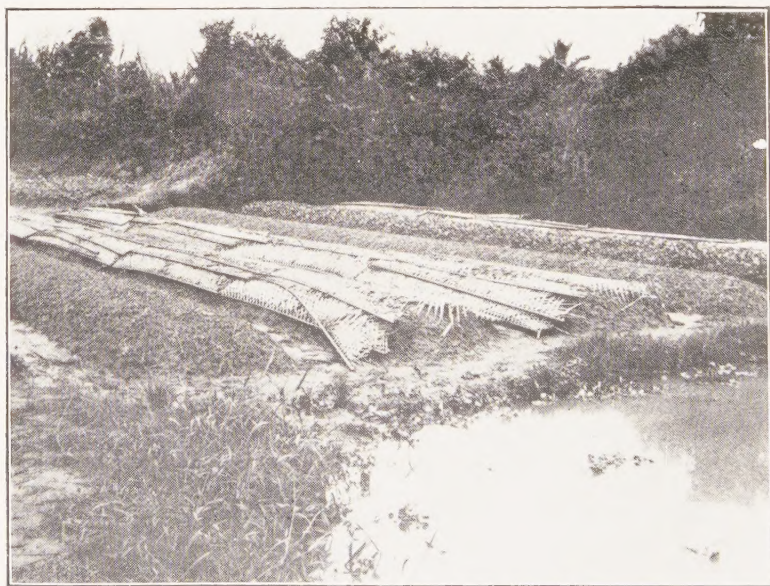
TOOLS USED BY MARKET GARDENERS

- Front.* Carrying-basket made of split bamboo.
On box. Weeding *changkol*, Fork for digging out *lalang* roots, Digging *changkol*.
Behind box. Small spade for digging drains, wells etc. Large split bamboo basket for carrying grass, with a *kanda* stick passed through handles.



A TYPICAL CHINESE MARKET GARDEN

Note the flat and low-lying nature of the land. The beds, however, have been well raised and cultivated so as to ensure adequate drainage.



NURSERY BEDS

Note proximity of water supply—an artificial pond. The pond was also used for breeding fish.

The seeds are first mixed with wood ashes or earth and then scattered lightly over the prepared nursery beds. The bed is then covered to a depth of 1 inch with *lalang* shoots laid lengthwise along the beds, or by *attap* (dried leaf covering).

This covering of *lalang* or *attap* not only protects the germinating seeds from damage by heavy rain and hot sun, but also assists in retaining moisture in the beds. As soon as the young plants have become well established, the covering is removed and replaced by a temporary shelter made by erecting a light wooden frame some $2\frac{1}{2}$ to 3 feet high over the beds and thatching the roof with *lalang* or *attap*. This shed is removed when the young plants are 4 to 5 inches high.

Sowing in the Field.

The larger varieties of seeds are planted in specially prepared pockets of soil on the top of the already prepared ridges. These pockets are made by scraping out little hollows about 3 inches deep and 6 inches in diameter, and refilling with a mixture of black earth (i.e. soil rich in humus) and manure. The seeds are sown in pairs or threes in the centre of each pocket, and covered to the required depth. One or two rows of plants may be planted on each ridge, according to the variety of plant and the width of ridge.

After sowing, the ridges are shaded with *lalang* shoots, or by placing two or three small leafy twigs around each plant until the seedlings are well established.

Transplanting.

When the young plants grown in the nurseries are sufficiently large to handle, they are transplanted in the prepared ridges. The planting holes are prepared in the same way as those for seeds sown directly in the field.

Careful attention is given to the correct spacing of plants in the field, the plants being not only regularly spaced but also at the optimum intervals. These intervals appear to have been carefully worked out many years ago by a method of trial and error, and the knowledge has been handed down from generation to generation.

After transplanting, the young plants are shaded for about 10 days by small leafy twigs or pieces of *attap*.

Secondary Cultivation.

As soon as the plants have become well established and are big enough to be seen easily, the soil between them is kept well broken up by means of a light *changkol*. This secondary cultivation is looked upon as a most necessary task and is repeated at frequent intervals and carried on as long as possible without damaging the plants.

Manuring.

The most commonly used manures are pig-manure, night soil and prawn sweepings. Although the use of night soil is severely condemned by the Health Authorities, there is little doubt that without its aid a large number of market gardens, especially those established on old mining land, would never have been brought to their present high state of fertility. The use of artificial manures to replace night soil is a very recent introduction and is making but slow headway, chiefly owing to the greater cost of such manures.

Pig-manure, and often night soil, is collected in specially constructed concrete pits connected to the pig styes. The majority of these are partly covered to keep out rain, but few are provided with any means of preventing excess of water used in cleaning the styes from mixing with the manure in the pits.

The usual method of applying pig-manure and night soil to vegetables is as a liquid top-dressing, the manure being first diluted with about eight parts of water. When applying manure to crops grown for pig food, such as sweet potato and vines, accurate dilution is not insisted upon, and in such cases all the water used for bathing the pigs and washing down the styes is run into the manure pits. This, together with a certain amount of rain-water that finds its way in, gives sufficient dilution. This diluted mixture is poured round the plants—by means of a small dipper fitted on a long handle—at intervals of about 7 days throughout the growing period.

Prawn sweepings are usually applied either in the holes before the crop is planted, or worked in near the rows as an early top-dressing. The usual rate of application is about 8 kati (12 lbs.) to every 32 holes.

Irrigation and Watering.

The Chinese market gardener seems to possess an inborn knowledge of irrigation and water requirements of his crops, and probably no other agriculturist can decide so accurately, merely by observation, when and how much to irrigate, and when and how often to water the young plants. There is little doubt that the success of a great number of gardens is largely due to this skill.

During dry weather it is the usual custom, whenever possible, for the gardener to irrigate his beds by damming a nearby stream and allowing the water to flood the hollows between the ridges on which the plants are growing. The irrigation water is allowed to remain on the land for 3 to 4 days by which time the soil is judged to be in the right condition.

In addition to irrigating and where irrigation cannot be carried out, the plants are watered morning and evening during dry weather. This work is extremely laborious and entails carrying vast amounts of water, as the gardeners, realising that it is useless just to sprinkle the soil, always make a point of



Method of watering growing crops using two large converted tubs and 'Kanda' stick.



CHINESE WATERING CANS



THE CHANGKOL, SHOWING METHOD OF USING
This is the implement used throughout Malaya for
all primary and most of the secondary cultivation.



Method of carrying liquids, using wooden tubs
and a *kanda* stick. The small ladle fitted to the end
of the stick is used for applying liquid manure.

saturating it. The watering is done by means of large wooden tubs fitted with spouts, each tub holding about 8 gallons of water. This work, in the case of Cantonese gardeners, is generally allotted to women.

Rotation of Crops.

Although no fixed rotation of crops is practised, the same land is never made to carry two successive crops. This is achieved by the simple method, when making up new beds, of dividing the old ones into halves and dragging the soil from half the bed on two adjoining ridges into the hollows between the old beds (as is shown in the accompanying illustration). Thus, the old paths become the centres of the new beds, and the centres of the old ridges new paths. Care is taken while moving the soil from one place to another, not to bring up to the surface raw sub-soil. The new bed so made is never planted with either of the crops previously grown on the two beds from which it was constructed.

Seed Selection.

The Chinese gardener fully realises the importance of sowing good seed. Having first obtained good varieties that grow well on his particular land, he takes great care to preserve the strain, by selecting seeds only from those plants that are above the average. If there are no such plants to be found growing in his garden, he will first try to obtain fresh seed from his neighbours—and if that fails—buy fresh imported seed. Poor, weakly plants are never kept for seed purposes.

Improving the Soil.

If, after one or two crops, the gardener finds that his crops are small and unprofitable, he sows all the poor areas with sweet potatoes followed by yam beans and then by groundnuts, after which he generally finds that he can grow two or three profitable crops. On such lands, large amounts of organic matter, in the form of grass and leaves, are incorporated into the soil in preparing the land for planting. The land once cleared is never allowed to go back into *lalang* and secondary growth as it involves extra labour and expense.

Control of Pests.

Hand-picking and the use of tuba root solution form the chief methods of controlling pests of all kinds. The tuba root solution is made by crushing 4 *tahil* (about 6 ozs.) of tuba root and mixing with 6 gallons of water and is applied by dipping a leafy shoot such as a young bamboo into the mixture and flicking the liquid over the plants. For leaf vegetables, the operation is repeated at intervals of 3 to 4 days throughout the growing season. Ashes are sometimes dusted over the plants as a remedy against moulds and blights. Birds are scared away from seed beds by means of guys—made in exactly the same way as those used in England.

General.

The majority of the Chinese market gardeners in the Federated Malay States are established on old worked-out tin-mining land which is readily drainable and irrigable. The natural fertility of such land is extremely low, and yet it is found that after a few years of working by a Chinese market gardener, a very high degree of fertility is obtained.

The secret for the successful working of such land lies in the abundant use of organic manures, chiefly applied in the liquid form, and frequent deep and thorough cultivation. •

Another factor that plays an important part in obtaining good crops from such land is the judicious irrigation and watering of the crops.

THE SOURCES OF "TUBA" IN THE MALAY PENINSULA.

BY

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Two species of *Derris* are commonly cultivated in the Malay Peninsula for *tuba*, 1. *Derris elliptica* and 2. *Derris malaccensis*. The first is a widely spread plant, found from Chittagong through Siam, Cambodia and Malaya to New Guinea and the Bismarck Archipelago. There is some doubt as to whether it is ever found truly wild in the Peninsula.

The second species is a native of the Peninsula and is recorded also from Siam, Tenasserim and Borneo. As grown under cultivation it differs in some important respects from the wild plant, notably in the larger flowers with more hairy calyx and a silky standard, approaching in this respect *Derris elliptica*. For this reason it is proposed to regard it as a variety of *Derris malaccensis* under the name *sarawakensis*. It perhaps would have been better, from a botanical point of view, to have treated it as a species distinct from both *D. malaccensis* and *D. elliptica*, but the name *malaccensis* is now so well known to planters and others in the trade that it would have been confusing to do so. As far as can be ascertained, most, if not all of the stock of *D. malaccensis* now grown here originated in Sarawak or in that neighbourhood. Hence the varietal name, and another name by which it is often known—"Sarawak erect".

As the different kinds of *Derris* differ in their toxic values, it is necessary to have some means of distinguishing them. In the following pages an attempt is made to show how at least the better known and most marked forms or races may be distinguished in the field by leaf characters and habit of growth. An easily-remembered name is attached to each form described.

In the group of true *Derris elliptica*, the variation in leaf-shape is very confusing, even within the same race, and many more races than are given here could be erected on minor differences in leaf-shape, degrees of hairiness and other characters. However, by taking a fairly broad view of what constituted a race, it was found possible to include all the cultivated material seen in the number to be described. After a little practice, these can all be picked out with a fair degree of certainty from a field in which they are growing mixed together.

It must be emphasised that no one leaf from any plant can be relied upon to show all the differentiating points. It is necessary to examine many leaves and to form a general impression of the predominating characters.

The first point to be looked for is the habit of growth of plant. This may be :—

1. Erect, shrub-like, no trailing stems, not forming a cover on the soil.
2. Prostrate, stems trailing on the ground, rooting more or less profusely between nodes and forming a close cover.
3. Prostrate, stems trailing on the ground, habit looser than in 2, stems not rooting profusely, or not at all, not forming a close cover.
4. Prostrate as in 3, but sending up erect or semi-erect woody side shoots.

All *Derris* plants are climbers, and all the prostrate races send up vigorous young shoots which stand semi-erect, but these are to be ignored.

Derris leaves are compound, that is, instead of having a single blade they have many, arranged in pairs along a central stalk, with one terminal one. There is always therefore an odd number of leaflets. That part of the central stalk from the swollen part at the base to the insertion of the lowermost pair of leaflets is called the *petiole* (leaf-stalk) and the rest of the central stalk is the *rachis*. The leaflets are each attached to the rachis by a short stalk called the *petiolule*.

A glance at the drawings will show that the leaves of all the races have a general similarity, but that differences can be observed. The points to look for are :—

1. *Shape of leaflets*. They are usually more or less obovate (inversely ovate, with the broadest part above the middle), but may be ovate (broadest part below the middle), oblong (sides more nearly parallel), or a combination of these shapes. Terminal leaflets tend to be more obovate than the others and the basal one or two pairs tend to be more oblong and reduced in size.

2. *Shape of leaflet tips*. These may be :—

- (a). A definite rather long narrow point as in fig. 1.

- (b). A short, quite definite but broad blunt point as in fig. 7.

- (c). Rounded, or with a very short broad blunt indefinite point as in fig. 8.

3. *Overlapping of leaflets* when a leaf is laid flat.

4. *Degree of hairiness*. All the races dealt with are hairy to some extent, but they vary considerably in the amount present. Very young shoots and leaves are usually densely hairy. In some cases the hairs are not visible to the naked eye, but under a pocket lens, magnifying 8 or 10 times, can always be seen. The hairs tend to drop off as the leaf becomes old.

5. *Colour of lower surface of leaflet*. All but one of the forms described have a whitish bloom on the under surface of the leaflet. This is quite distinct from any reddish tinge imparted by hairiness.

6. *Number of leaflets*. The number is usually 7 or more. Some races average 7 or 9, rarely more, others 9 or 11 or more, rarely less.

Key to Races Described.

(The number preceding each name is that of the paragraph in which the description of the race will be found).



Fig. 1. *Derris malaccensis* var. *sarawakensis*.



Fig. 2. *Derris malaccensis* var. *sarawakensis*.
Above: Terminal leaflets from same plant.
Below: Side leaflets from same plant.



Fig. 3. *Derris elliptica*, Sarawak creeping.

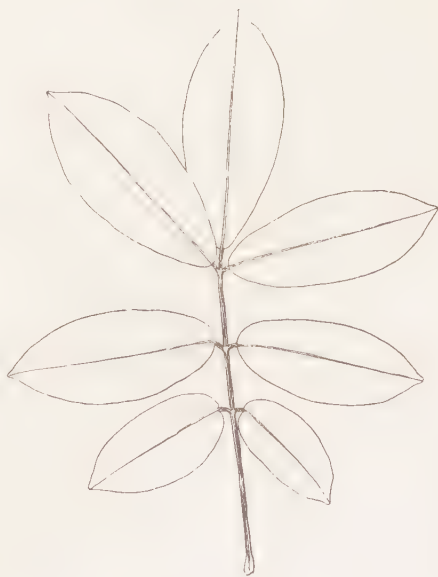


Fig. 4. *Derris elliptica*, Singapore No. 1

- A. Habit erect, shrub-like, leaflets with a definite long narrow point, very sparsely hairy and not white below.....1. *Derris malaccensis* var. *sarawakensis*.
- A. Habit prostrate, leaves whitish below :
 - B. Stems rooting more or less profusely between nodes, forming a close cover, leaflets with a definite long narrow point, very sparsely hairy below.....2. *Derris elliptica* Sarawak creeping.
 - B. Stems not rooting profusely, not forming a dense cover, leaflets most usually with a short blunt point or rounded :
 - C. Leaflets sparsely hairy below, hairs not or hardly visible to the naked eye :
 - D. Leaflets averaging 7 or 9, not or only slightly overlapping.....
.....3a. *Derris elliptica* Singapore No. 1.
 - D. Leaflets averaging 9 or 11 or more, overlapping.....
.....3b. *Derris elliptica* Singapore No. 2.
 - C. Leaflets much more hairy below, the hairs, at least on the main veins, distinctly visible to the naked eye :
 - D. Stems with erect or semi-erect woody side shoots, leaflets rather narrow, with a definite short blunt point, rachis usually rather densely hairy.....5. *Derris elliptica* Changi No. 2.
 - D. Stems without erect or semi-erect woody side shoots :
 - E. Leaflets rather broad, overlapping, tending to be oblong, with a very indefinite broad blunt point or completely rounded or with a small notch at the apex.....
.....6. *Derris elliptica* Changi No. 3.
 - E. Leaflets rather narrow, hardly or not overlapping, with a definite broad blunt point.....
.....4. *Derris elliptica* Changi No. 1.

Preliminary identifications should be made from the key and checked with the descriptions below.

Short Descriptions of Races Mentioned.

1. *Derris malaccensis* var. *sarawakensis*.* An erect shrub-like plant, the stems not trailing on the ground or forming a cover. Leaflets 7 or 9, rarely more, rather variable in shape and size, but the side ones usually markedly oblong, the uppermost pair and terminal one usually definitely obovate, tips of leaflets with a definite, prolonged narrow point. Upper surface of leaflets more or less shining, with a few scattered white hairs, visible under a lens, older leaflets often without hairs above; lower surface paler green than upper surface, surface, without white bloom, always with some reddish hair which is more pronounced on the veins and reticulations than on the intervening spaces. Both surfaces appear to the naked eye to be without hair, but a lens will always show

**Derris malaccensis*, Prain, var. *sarawakensis*, Hend., var. nov. A typo floribus maioribus, vexillo pubescente differt.

some hair on the lower surface. Petiole, rachis and petiolules usually with sparse whitish hairs, or the petiole without hairs, petiolules sometimes brownish, usually green.

Distinguished at a glance from other kinds by its erect shrubby habit, the pointed leaflets without white bloom beneath, and sparseness of hair.

Widely known under the names "tuba rabut" and "Sarawak erect". It has also been wrongly called *Derris chinensis* and *Derris uliginosa*, Figs. 1 and 2.

2. *Derris elliptica Sarawak creeping*. Plant prostrate, forming a close cover, with the stems often rooting profusely between nodes. Leaflets usually 7 or 9, not overlapping when leaf is laid flat, or the terminal one and the uppermost pair overlapping slightly, shape similar to that of *D. malaccensis* var. *sarawakensis*, usually obovate or obovate-oblong, the basal pairs broader, the bases of upper leaflets narrowed and hardly rounded, those of lower leaflets broader and more rounded; tips usually with a definite prolonged narrow point. Upper surface of leaflets shining, without hair or with very sparse whitish hairs visible under a lens; lower surface with whitish bloom and a sparse covering of pale reddish hairs visible only under a lens. Petiole, rachis and petiolules very sparsely whitish or pale red hairy, or sometimes practically without hair, the backs of petiole and rachis without hair. Very young leaves comparatively sparsely reddish hairy.

In leaf shape very similar to *D. malaccensis* var. *sarawakensis*, but the prostrate habit at once distinguishes it. From the forms described below it is distinguishable by its pointed leaflets, dense habit and very sparse hairiness. Fig. 3.

3. *Derris elliptica Singapore No. 1*. Plant prostrate, stems trailing but not forming a dense cover. Leaflets 7 or 9 or more, very variable in size and rather variable in shape, but usually obovate or obovate oblong, the lower one or two pairs reduced in size and broader in proportion than the others; tips usually with a definite short blunt point, the apex of which often has a minute but distinct notch; bases narrowed then rounded, the lowermost pairs often not narrowed. Upper surface of leaflets rather dull, with sparse whitish hairs hardly or not visible to the naked eye; lower surface with a distinct white bloom except on the veins, and with a sparse covering of reddish hairs on the veins and reticulations, hardly visible to the naked eye except as a reddish tinge on the main nerves. Petiole, rachis and petiolules with sparse whitish or pale red hairs, the petiole soon losing them, the back of the rachis without hair.

Distinguished from *Sarawak creeping* by the looser habit, the blunter leaflet tips and the slightly more pronounced hairiness, and from the following forms by the definitely less hairy leaflets and rachis. Figs. 4, 5, 6.

Not many plants have been seen of this race, but they seem sufficiently distinct from the others. Even in the few plants seen it was possible to subdivide the race into



Fig. 5. *Derris elliptica*, Singapore No. 2.



Fig. 6. *Derris elliptica*, Singapore No. 2.

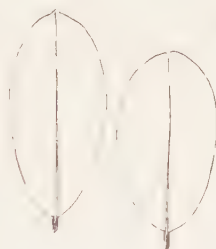


Fig. 9. *Derris elliptica*, Changi No. 3.
Side leaflets.

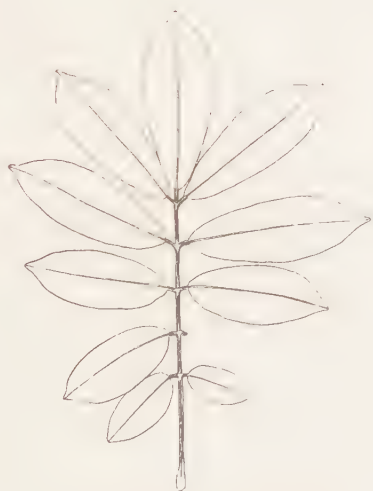


Fig. 7. *Derris elliptica*, Changi No. 1.

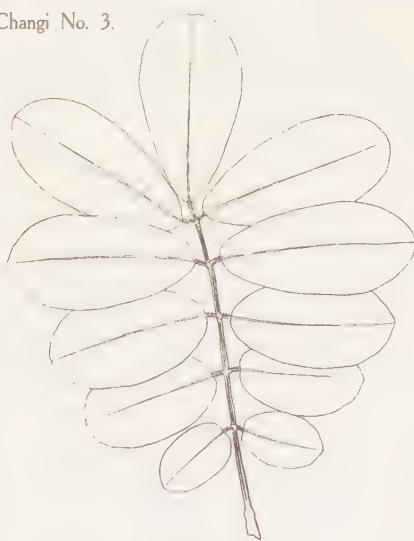


Fig. 8. *Derris elliptica*, Changi No. 3.

- a. Plants with leaflets averaging 7 or 9 only, the leaflets rather distant, not or only slightly overlapping when laid flat. Fig. 4.
- b. Plants with leaflets averaging 9 or more, overlapping. Figs. 5 and 6.

No other essential difference could be detected between these two sub-forms, but if it is considered advisable to keep them apart, *a* (with 7 or 9 leaflets) may be called *Derris elliptica Singapore No. 1*, and *b* (with 9 or more leaflets) *D. elliptica Singapore No. 2*.

4. *Derris elliptica Changi No. 1*. Plant prostrate with long trailing stems, not forming a close cover or rooting profusely, and without erect woody side shoots, although the young shoots are often erect. Leaflets 9 or 11 or more, rarely less than 9, rather narrowly obovate, the basal leaflets broader and more oblong, often reduced in size, the upper leaflets very definitely narrowed to a rounded base; leaflet tips with a definite short blunt point, the apex often minutely notched. Leaflets not or only slightly overlapping, texture rather thick, upper surface dull, always with some scattered white hairs especially along the veins, hardly visible to the naked eye; lower surface with whitish bloom, rather densely hairy, particularly on the veins, the hairiness easily visible to the naked eye, though it tends to become sparser in older leaves. Young shoots and leaves densely red hairy. Petioles, rachis and petiolules rather densely to sparsely whitish or pale red hairy, the back of the rachis usually with some hair.

Distinguishable from *Sarawak creeping* by its looser habit, bluntly pointed leaflets and increased hairiness, from *Singapore Nos. 1 and 2* by its narrower and somewhat thicker leaflets and increased hairiness and by its slightly longer leaflet tips.

This is the form most generally cultivated in Singapore. The Chinese name *Ney Kee* is given for it. Fig. 7.

5. *Derris elliptica Changi No. 2*. This form is very close to *Changi No. 1* and very difficult to separate from it on leaf characters alone. The same description would fit leaves of both, except that those of *Changi No. 2* tend to be slightly broader towards the base of the leaflets, the leaflet tip is slightly shorter and broader, and the hairiness appears to be always somewhat more pronounced, with the petiole and rachis definitely more hairy, the hairs persisting longer on the backs of both. The chief difference is in the habit of growth. *Changi No. 2* has erect woody side shoots, and in a field where *Changi No. 1* and *Changi No. 2* are growing together, the latter can be picked out with some degree of certainty by this character alone.

Changi No. 2 is distinguishable from *Singapore Nos. 1 and 2* by the narrower, somewhat thicker, and much more hairy leaflets.

The Chinese name *Lui Ting* is given for this form.

6. *Derris elliptica Changi No. 3*. Plant prostrate, stems trailing but not forming a dense cover, and without erect woody side shoots. Leaflets 9 or more, rarely less, usually distinctly overlapping, obovate to obovate oblong, the bases

only slightly narrowed and then rounded; leaflet tips very blunt, sometimes with a very short broad blunt point often notched at its apex, or rounded with no point and notched, or rounded and not notched. Upper surface dull, usually with a few scattered white hairs, especially on the veins, visible under a lens, often without hairs; lower surface with a dull, rather dirty white bloom, reddish hairy especially on the veins, hairiness visible to the naked eye. Petioles, rachis and petiolules sparsely to very sparsely reddish or dirty white hairy, in the older leaves losing most of their hair, in younger but fully developed leaves the backs of the petioles and rachis sparsely hairy.

Distinguished from *Singapore Nos. 1* and *2* by the somewhat thicker, usually smaller leaflets with distinctly more hair below, and by the blunter leaflet tips, and from *Changi Nos. 1* and *2* by the broader leaflets not so markedly narrowed to the base, the much blunter leaflet tips and the sparser covering of hair.

The Chinese name *Low Ting* is given for this form. Figs. 8 and 9.

American botanists have adopted an older name—*Dequelia*—for *Derris*, which may cause some confusion. However, according to the code of rules of nomenclature followed by most British and Continental botanists, *Derris* is the correct name to use.

I am indebted to Mr. J. N. Milsum, Central Experiment Station, Serdang and to Mr. G. P. D. Olds, Agricultural Officer, Singapore, for much help and advice; and to Messrs. Cooper McDougall & Robertson, Ltd., Bentong, the Senai Rubber Estate Co., Ltd., and Mr. George D. Mackay, Singapore, for specimens and information. I have also to thank the Director, Royal Botanic Gardens, Kew for identifying certain specimens; the Director, Algemeen Proefstation voor den Landbouw, Java, for a set of specimens, and the Curator, Sarawak Museum, for the loan of material from Borneo.

THE AVOCADO PEAR

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The Avocado Pear is a comparatively recent introduction to horticulture although it has been cultivated in Mexico and Central America from very early times. In these countries the fruit is cultivated around dwellings, no large plantations exist and very little care has been taken with its cultivation (1). During the last thirty years or so, horticulturists in California and Florida have devoted attention to its cultivation and the vegetative propagation of superior varieties. In these two States the cultivation of the Avocado has become of commercial importance. It is also cultivated largely in the West Indies and Hawaii.

The commercial aspect of Avocado culture has been especially emphasised since 1910 (2) when explorers from the United States of America were sent to Mexico and Guatemala to obtain the best varieties cultivated in those regions. The California Avocado Association, which was organised in 1915, has influenced the development of the industry (2) and its committee has rendered valuable service by the registration and classification of varieties. The Year Book of this Association for 1931 contains a list of 400 varieties including names of Avocados published in the West Indies and Hawaii (3).

A co-operative marketing agency, founded by the Calavo Growers of California, in 1924, assists with the marketing of the fruit, and a similar organisation exists in Hawaii, shipping the fruits to American markets (7).

The Avocado is now cultivated in most tropical and sub-tropical countries although it has not yet become as popular elsewhere as it is in America.

The date of the introduction of the Avocado into Malaya is uncertain, but Ridley (4) mentions that trees were fruiting in Singapore in 1902. The Avocado was also being cultivated at the Government Experimental Plantation, Kuala Lumpur in 1908 (5). A few of these trees fruited in 1913 and, early in 1914, the present writer (6) advocated extending the cultivation of the fruit. Since that date the Avocado has been grown on a small scale in different parts of the Peninsula and has fruited well both in the plains and at the "Gap" 2,800 feet above sea-level. During the last decade, seedlings have been distributed by the Department of Agriculture; in spite of this fact, the fruit is not as widely known, even among Europeans, as it deserves to be. This is probably due to the fact that a taste for the fruit has to be acquired, in consequence of which it is rarely seen in the local markets.

Botanical.

The Avocado Pear belongs to the Natural Order *Lauraceae* and is therefore related to the Cinnamon. The varieties under cultivation are of two species, viz. *Persea gratissima*, Guertn (syn. *P. americana*, Mill.) and *P. drymifolia*, Cham. and Schlecht (syn. *P. americana* var. *drymifolia*, Mez.) The former species include the West Indian and Guatemalan types or races and the latter the Mexican types (1).

It is a tree of medium size, attaining a height of 20 to 30 feet under cultivation, but in Central America it is recorded that old trees reach a height of 60 feet (1).

The tree may be either erect, compact, or spreading in habit. The bark of the trunk and older parts of the branches are grey in colour while the tips are smooth and green. The leaves are alternate, crowded near the ends of the branches and vary in shape from lanceolate to ovate or even obovate with blunt to acuminate tips. The blades of the leaves vary from 3 to 4 inches to as much as a foot in length, light to dark green in colour, smooth and shining above and glaucous beneath. The flowers are small, yellowish-green in colour, complete with both stamens and pistils, and they are borne in racemes near the ends of the branches.

Stouts (9 and 15) investigations on the Avocado have enabled him to classify varieties into two groups (1) those (Group A) in which the flowers function as pistilates or females in the forenoon and staminate in the afternoon and (2) those (Group B) which function as males in the forenoon and females in the afternoon. The flowers open synchronously in sets and there are normally two periods of opening. In Group A the first period of opening takes place in the forenoon when the stigmas are receptive. These flowers close at about midday and open again for the shedding of pollen in the afternoon of the following day. In Group B the flowers open for the first or female phase in the afternoon, close in the evening, opening again for shedding pollen on the following morning or on the morning of the third day. There is a certain amount of overlapping as regards opening and closing of flowers, especially under unfavourable weather conditions when the first and second openings of the flowers are often delayed. Some varieties have been found to produce excellent crops of fruits in the absence of trees of another group, but despite these observed instances in which trees are not dependent upon cross-pollination, Stout considers that interplanting of reciprocating varieties is normally advisable to ensure that proper pollination takes place which is essential to the production of fruit.

Varieties.

The varieties of both species of Avocado are closely alike in many respects; the differences between the different races are briefly as follows (1):—

1. Leaves anise-scented, skin of fruit thin and membranous (rarely more than 1/32 inch thick)—*Persea drymifolia*. The Mexican race.

2. Leaves not anise-scented, skin of fruit thicker (from $1/32$ to $1/4$ inch in thickness)—*Persea gratissima*:

- (a) Fruit ripe in summer, skin usually not more than $1/16$ inch thick, leathery in texture—West Indian Race.
- (b) Fruit ripening in winter and spring, skin $1/16$ to $1/4$ inch thick, woody in texture—Guatemalan Race.

The Mexican race is a native of the Mexican highlands and will therefore withstand cold conditions.

The West Indian race has been developed in the tropical lowlands of Guatemala, while the Guatemalan race is a product of the highlands, but there are intermediate forms.

Other distinguishing characters are that the flower of *P. drymifolia* is more pubescent and the underside of the leaf more glabrous than that of *P. gratissima*. The fruits of both species vary in size, but those of *P. drymifolia* are usually smaller than those of *P. gratissima*. They vary in size from a few ounces to three pounds; in shape from round to oval and pear-shaped, and in colour from green to purplish-black. The fruit is a drupe having a single large seed, often 2 inches in diameter, in the centre. The edible portion of the fruit is between the skin and the seed, and when ripe is of the consistency of butter, cream-coloured to green near the skin, of a nutty flavour and contains a large percentage of fat.

The varieties cultivated in Malaya vary considerably in size, shape, and also colour of the fruit, but the majority belong to the West Indian race. The Mexican type is little known, but a few seedling trees are growing at the Central Experiment Station, Serdang, although they have not yet fruited. In Malaya, the West Indian varieties are suitable for cultivation from sea-level up to an elevation of about 3,000 feet. The Guatemalan varieties are said to withstand both cold and heat, also a dry climate, while the Mexican varieties are said to withstand a few degrees of frost. These two races may thrive at higher elevations in this country.

In selecting varieties for cultivation, preference should be given to those with fruits of medium size, say 12 to 16 ounces. The fruit should be of good flavour, the skin tough, leathery and of moderate thickness, so that they will withstand transport for some distance. The seeds should be small and not loose in the cavity otherwise the flesh may be injured in transit.

Propagation.

Propagation locally has been by seed, but the disadvantage of this method is that the offspring cannot be relied upon to come true to the parent type; the Avocado is therefore usually propagated by budding or grafting.

Attempts have been made to propagate the Avocado by marcottage but so far without success, although it is reported that, after numerous failures, well-rooted plants have been obtained by this method in the Philippines (10).

By planting seedlings in beds and laying them down for propagation by the etiolated shoot method, rooted shoots have been obtained, but so far the difficulty in obtaining authentic planting material has made this method impracticable. A stock of budded material is, however, being raised by this Department and will be available in the rear future, when budded plants of known origin have been established by the eteolation method may prove useful for rapidly increasing supplies of reliable planting material.

The most common method of propagation is by budding and grafting, and the best stocks to use for this purpose in Malaya are seedlings of our local varieties. In California, the Guatemalan race has been budded on to stocks of the Mexican race with the object of giving hardiness to the former, but in the even climate of the plains of Malaya hardiness is a point of little if any importance.

Raising Stocks.—The seeds should be planted as soon as possible after removal from the fruit. They should be planted pointed end upwards in loose sandy soil, in boxes or seed beds and after germination the seedlings should be transplanted into large bamboo pots or into nursery beds at about 18 inches apart. Germination takes place in a short time and seedlings are ready to bud in six to eight months, when the stems will be about one half inch in diameter. It is essential that seedlings to be used as stocks should be maintained in vigorous growth.

Budding Methods.—Several methods of budding Avocados are recommended and have been successful in other countries. It should be borne in mind, however, that skill and patience are required, and above all a very sharp budding knife. For the benefit of those who do not understand the various methods of budding, they are described briefly as follows:—

The “inverted T” method is performed by making a “**⊥**” shaped incision in the bark of the stock an inch or two from the ground with the blade of a sharp knife. Budwood is then procured from a shoot of recent growth not soft enough to snap when bent but beginning to mature. The buds should be plump but not bursting into growth. The knife should then be inserted about an inch below the bud and drawn upwards and inwards beneath the bud, bringing it out about the same distance above the bud. A shield-shaped piece of bark with a section of wood attached is then obtained. The section of wood should be carefully removed and the bud attached to the piece of bark inserted into the incision in the stock. The bud is then bound firmly in place with raffia or a thin strip of waxed cloth, taking care not to cover the bud completely. In about three weeks from the time of budding the tying material should be removed and if, on examination, the bud is found to be green it should be retied but not tightly, and at the same time the apex of the stock should be pinched out. The bud should be examined again at the end of six weeks and if it is still alive the wrapping may be removed. At the same time the stock may be cut back still further, but some leaves should be left. The stock should not

be cut back completely until the bud shoot is about 2 feet in length. When cutting back the stock, a neat cut should be made close to the union between bud-shoot and scion and the wound should be covered with some protective material such as grafting wax.

Other methods of budding recommended differ only in the shape of the incision in the stock. The Forkert method, a modified form of rectangular patch budding, has been used successfully in Java (12) with buds from non-petioled ripe budwood. The method consists in making three incisions in the stock, two parallel downwards and one across the top, forming three sides of a rectangle. The bark is then raised carefully, gripped between the blade of the knife and the thumb and stripped downwards. Three quarters of the flap of bark is then cut away. A piece of bark of the same size and shape as the incision in the stock containing a bud is then inserted and tied into place. The subsequent procedure is the same as for the inverted "T" method.

Grafting.—In Florida (1) the Avocado has been propagated by grafting the tips of young shoots on to the shoots of young seedlings by a modified method of side-grafting. The operation is performed as follows:—The seeds are germinated in boxes and, when the young shoots are 5 to 6 inches in length, the seedlings are taken from the box and laid on a bench. A cut one inch long is made in the side of the shoot just above the seed and a thin section is removed. The scion is taken from the tip of a small branchlet not fully mature and about one inch long with two axillary buds in addition to the terminal one. The scion is then tapered on one side to fit the cut on the stock and is bound into place. The plant is afterwards potted, placed under partial shade and carefully watered from day to day. After union is effected the top of the seedling is removed and the scion allowed to grow.

Cleft Grafting.—Cleft grafting is used on young stocks and in top working older trees. For grafting on to young stocks the scion should be a partially mature shoot, greenish to light brown in colour and about 4 to 5 inches long. This should be tapered at the lower end and inserted in a cleft in the top of a stock of the same colour and size as the scion (10).

Top Grafting.—This method is used in cases where a tree has proved to be unfruitful or is of an inferior variety. The trunk is cut back with a saw to within three feet of the ground. The trunk is then split, a saw being used to cut down for several inches when a soft wood wedge is inserted and driven in until the trunk commences to split; the edges of the cleft are then smoothed with a knife. Scions of mature growth are then cut and tapered to fit the cleft, one on each side of the trunk, so that the cambiums of both stock and scion are in contact. The wedge is then lifted sufficiently to allow enough pressure from the cleft in the stock to hold the scion in place, after which the wedge is cut off flush with the top of the stock. The cleft and sides of the stock are then covered with grafting wax to prevent the entrance of water. To prevent sun-scorch the top of the stock and the scion is covered with a tough

paper bag, holes being made to allow new growth from the scion to elongate. Another method is to place a paper collar round the top of the stock and fill it with sand, holes being made in the base to allow drainage of rain water. The sand should be placed round the outside of the scion as well as at the top of the stock. These paper coverings should not be removed until the scion is large enough to provide shade. A certain number of shoots from the stock may be allowed to grow to maintain circulation of sap which assists healing. They should be eliminated as soon as the scion and stock have properly united.

Another method of top working old trees is to cut back a certain number of branches leaving one or two as "lungs" to maintain the circulation of sap. The young shoots, which sprout from the cut branches, should be limited to two or three; when large enough, they are budded in the same manner as seedling stocks.

Soils and Cultivation.

Soils.—The Avocado is said to thrive on a wide range of soils in South America. It grows excellently on both sandy soils in Florida and heavy clays in California, but it is essential that the soils should be well drained. In Malaya it has been grown successfully on both quartzite hill and quartzite valley soils, also in the granite soils of the hills.

Planting.—The distance at which to plant will depend upon whether the soil is particularly fertile or rather poor, also on whether the tree is a seedling or has been propagated vegetatively by budding or grafting. Planting distances recommended are 20 ft. x 20 ft. which allows 108 trees per acre to 26 ft. x 26 ft. or 64 trees per acre. On light sandy soils or with budded plants 20 ft. x 20 ft. is usually sufficient, but seedlings on rich soil may be given the wider spacing.

When planting it is advisable to make large holes, and these should be filled with good top soil and cattle manure or garden refuse. Usually holes 2 ft. x 2 ft. x 2 ft. should be dug and when filling them the soil should be made quite firm.

The Avocado is rather sensitive to disturbance of the roots; plants should therefore be raised in bamboo pots, so that they can be transplanted with the roots intact. If raised in nursery beds the plants should be prepared for transplanting by balling a week or two before this operation takes place. Should the roots be at all disturbed the foliage should be reduced or evaporation will be too rapid and the plants will receive a severe check.

The best time to plant is during the rainy seasons of the year; even at this time a good watering should be given to settle the soil round the roots and the plants shaded until they are established.

After-cultivation consists in keeping the soil round the plants free from weeds and, as the trees develop, the area weeded should be extended. A mulch of weeds and cattle manure is beneficial to the growth of the plant. The Avocado requires good cultivation and manuring to give the best results. Cattle manure, if obtainable, is best for general purposes. The growing of leguminous

green crops and turning them into the soil periodically will help considerably towards keeping the soil fertile. In addition, fertilizers are recommended (1) in the form of bone meal, and cotton seed or groundnut cake at the rate of 4 or 5 lbs. per tree added to the soil after the trees have borne fruit, and again after the fruit is set. Little is known about the manuring of the Avocado in Malaya, but in addition to cattle manure a mixture of basic slag, calcium cyanamide and sulphate of potash in the proportion by weight of 3 : 1 : 1 : may be applied twice a year round the trees at the rate of from 1 to 4 lbs. per tree according to age. If the trees appear to be growing vigorously, the calcium cyanamide may be omitted.

Pruning.—Very little pruning is necessary beyond that which is essential to keep the tree in shape, and the cutting out of dead or diseased branches.

Pest and Diseases.

In Malaya the Avocado Pear has so far been remarkably free from pests and diseases. In America, thrips, *Heliothrips rubrocinctus* and *H. haemorrhoidalis* have caused damage to the foliage, but spraying with nicotine solution has been an effective control. The red spider, *Tetranychus mytilaspidis* has also done damage but lime sulphur mixture has been used successfully in combatting this pest. Attacks by scale insects are also reported from America.

A root disease, *Sphaerostilbi repens*, has caused the death of several trees at the Central Experiment Station, Serdang, and a certain amount of die-back of branches has been noticed.

The Crop.

The Avocado tree, when raised from seed, commences to bear fruit in about the fifth or sixth year from planting, but budded trees are reported to bear fruit much earlier, in some cases, three years after planting. Seedlings planted at the Central Experiment Station, Serdang, in October, 1927 fruited in August and September, 1932. Others planted in April, 1928 fruited in August and September, 1933, while one tree planted in September, 1929 fruited in September, 1933.

Mature trees will bear from a few fruits up to several hundred. Large trees, in their country of origin, are said to bear from 1,000 to 3,000 fruits from 6 to 18 ounces each in weight. Trees bearing larger fruits bear less, the average, however, is said to be 200 to 300 fruits of 12 to 14 ounces each in weight.

Seedling trees vary considerably in their capacity for bearing fruit, they are also said to be irregular in bearing, for a tree bearing a good crop one year may not fruit the next. This is the case at the Central Experiment Station, Serdang, where only about 50 per cent. of the trees have borne fruit in 1933 and of these about half have borne an average crop, others a few fruits only. The fruits from different trees varied in size from 3 to 4 ounces up to 14 or 16 ounces; in colour from green to purple; the skins of the fruits of some trees

were quite smooth while others were rough. None of the trees bore very large fruits compared with varieties under cultivation in the countries of origin, California and Florida, where it is reported that varieties bear fruits up to 3 lbs. in weight.

The Avocado Pear at Serdang commences to flower about the middle of January and the fruits ripen in August and September. There is some difficulty in judging when some varieties are ripe, especially those with green skins. With the purple varieties there is not so much difficulty, for the fruits are green until they commence to ripen, when the colour gradually changes to a purple tinge. The fruits should be picked before they commence to soften, more especially if they are to be transported some distance to a market. Fruits picked when too under-ripe may shrivel slightly, but if picked when nearing maturity they may be stored until they soften.

Methods of Preparation for Food.

In its country of origin (8) the Avocado Pear forms an important article of diet to the population who use it daily throughout more than half the year. An Avocado and a few small corn cakes made from coarsely ground maize is considered, by the Indians of Guatemala, to constitute a good meal. The fruit is broken in half and the pulp, sprinkled with salt, is scooped out of the skin either with the fingers or a piece of corn cake. Among the Guatemalans of European blood, the pulp of the Avocado is usually added to meat soups at the time of serving and the flavour imparted is said to be exceedingly pleasant. Another usual practice is to serve a salad composed of thoroughly mashed Avocado pulp, vinegar, salt, pepper and finely chopped onions. This is said to be a popular and very tasty dish though not especially attractive in appearance.

In the United States of America, where the fruit is increasing in popularity, the pulp is used as a salad either alone or mixed with lettuce leaves, onions or other vegetables. Sliced or mashed it can be made into sandwiches with bread or cracker biscuits. It is excellent as a salad, either with cold meat or with bread and butter, when mashed and mixed with pepper, salt, and vinegar. Mashed with onions and lime juice it constitutes a favourite dish in Cuba. In Brazil it is looked upon more as a dessert fruit and is also made into ice-cream. The pulp of the fruit, mixed with a little sugar and sherry, has a pleasant nutty flavour and in this way can be used as a dessert.

Food Value.

The flesh of the Avocado is a nourishing article of food containing a high percentage of mineral matter, protein and fat. Its chief value as a food is its high fat content, the digestibility of which has been found by experiment to be equal to that of butter fat or of beef fat.

The calorific energy producing value of 28 varieties of Avocado examined at the University of California represents 1,000 calories for one pound of flesh. The maximum and minimum were 1,325 and 597 respectively. The maximum corresponds to 75 per cent. of the calorific value of cereals and is nearly twice that of lean meat.

The following table from Popenoe's Manual of Tropical and Sub-Tropical Fruits represents the work of Jaffa of the University of California on the food value of the Avocado :—

Variety.	Water. per cent.	Protein. per cent.	Fat. per cent.	Carbo- hydrates. per cent.	Ash. per cent.
Trap (West Indian) ...	78.66	1.61	9.80	9.08	0.85
Sharpless (Guatemalan) ...	71.21	1.70	20.54	5.43	1.12
Puebla (Mexican) ...	63.32	1.80	26.68	6.64	1.56
Fuerte (Hybrid) ...	69.86	1.25	29.14	7.40	1.35

Recent investigations by Le Roy Weatherley and Eugene W. Waterman of the University of California (14) using Albino rats as indicators, has demonstrated the presence of Vitamin "B" in the flesh of the fruit. The flesh or pulp was compared with Flesschmanns dry yeast standard and was found to have approximately one-twelfth the value of dried yeast. The authors comment as follows :—"From these investigations it is apparent that the Avocado ranks high as a source of Vitamin "B". If what is known as Vitamin "B" is in reality two vitamin factors one antineuritic and one growth promoting, as recent investigations seem to indicate, it is evident that the Avocado contains both factors since it prevents paralytic symptoms".

Summary.

1. The distribution, botanical, and distinguishing features of the different races of Avocado are discussed.
2. The different methods of propagation of the Avocado are given together with notes on its cultivation.
3. The methods of preparation, food value, and vitamin value of the Avocado are given.

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Miscellaneous Article.

Growth of the Soya bean Industry in America and its Effect on the Malayan Copra and Palm Oil Trade.

The United States of America have in past imported substantial quantities of copra and palm oil from Malaya and other tropical countries and despite the prevailing depression, exports of this produce from Malaya to the United States have been maintained even though there has been a marked decrease in the export in the year 1932 as the following figures show :—

		1930	1931	1932	1933
		tons	tons	tons	tons
Copra	...	27,579	23,350	10,579	17,618
Palm oil	...	772	1,267	925	2,991

It has, from time to time, been suggested in the United States of America that the importation of these products competes with local dairy produce and recently there has been a further revival of this contention in a more acute degree.

Foreign oils and fats, other than coconut oil, in 1932 constituted only 56-100 of 1 per cent. of the foreign oil ingredients of oleomargarine in the United States of America, while only 5½ per cent. of the edible oil and fat consumption of that country in 1932 was of foreign origin and most of this was used in the baking and confectionery trades. Practically all the imported oils and fats are the necessary raw materials of industries which are producing manufactured products of a non-edible nature, such as paint, varnish, soap, linoleum, tin-plate, and tanners of oils.

The above are the industries in the United States which absorb the bulk of the imports from Malaya of the products from the coconut palm and the oil palm. It is evident that there is not at present any real grounds for a conflict of interests with dairymen.

In the post-war period, the United States of America has been the largest single consumer of coconut oil, absorbing about one-third of the world's supplies, and the restriction of imports of copra and palm oil into the United States would undoubtedly have a marked effect on these industries in the producing countries.

The demand for coconut oil depends largely on the expansion of the soap industry and on the competition of other vegetable oils and fats and animal and marine fats used in this industry. The same applied, in a large measure, to palm oil, although in this case, it is believed that it is finding increasing favour in the United States for edible purposes.

In the *Malayan Agricultural Journal* published in March, 1933, the questions of the substitution of other oils for coconut oil and palm oil is discussed in abstracts from a report by (1) The Empire Marketing Board and (2) The United States Tariff Report on Certain Oils.

These reports, however, do not include figures relating to the growth of the soya bean industry in the United States which have recently been published in *The Journal of Chemical Education*, Vol. I, No. 10 (January 1933).

It appears from this article that the area under soya beans in the United States has increased from 50,000 acres in 1917 to 3,497,000 acres in 1931, and that this crop, which was formerly grown as a forage crop, is now grown to a large extent for crushing purposes. The quantities of beans crushed in recent years have been as follows:—

1925—26	—	10,520 tons.
1926—27	—	10,036 „
1927—28	—	16,728 „
1928—29	—	26,448 „
1929—30	—	48,038 „
1930—31	—	121,455 „

If the importation of copra and oil palm products into the United States is restricted in order to encourage home production of oil-producing crops, it is not improbable that the demand for coconut and oil palm products in the United States will in the future tend to diminish.

Abstract.

AGRICULTURE IN THE PHILIPPINE ISLANDS.*

The Governor-General, Theodore Roosevelt, arrived in the Philippines on 29th February, 1932, when it was found that the Government expenditure for 1931 had exceeded the revenues by 7,200,000 pesos. He, therefore, set out to familiarise himself with the country and its problems by personal inspections and contact with the leading citizens. As a result of his energetic investigations, he concluded that immediate action must be directed towards a balanced budget, a re-organisation of the Government on lines of greater economy and efficiency and a revision of its revenue system. He realised, at the same time, that positive action must be taken to develop and foster industries in order to lay a broader base for prosperity in the future. He recognised that particular attention must be devoted to the welfare of the small-holder who was most seriously affected by the crisis as the Philippines are primarily dependent on agriculture, the basic products on which the wealth of the country depends being copra, rice, tobacco, hemp and sugar. Since 1929 the prices of all these products had depreciated very heavily.

By March, 1932, it became apparent that 1932 revenue would fall short of the estimates by over 17 million pesos; consequently, the Governor-General laid the situation before his councillors and immediate steps were taken to effect economies estimated at over 6 million pesos or approximately 20 per cent. reduction in the latter six months of the year. Resulting from the adoption of these economies, coupled with an unexpected gain in customs revenues due to heavy imports in anticipation of increases in tariff rates, the year 1932 ended with a surplus balance. In addition to the executive action described above, legislative action was taken to eliminate duplication of duties as far as possible.

For the purpose of balancing the budget in 1933, a further reduction of 24 per cent. was made in the operating cost of the governmental machinery, thus reducing the estimates to a total of 42,000,000 pesos.

In addition to this heavy reduction, the Governor-General was empowered to reduce all or any part of a budget by 10 per cent. should it be found necessary in order to ensure that expenditure did not exceed income and it was enacted that no new public works should be initiated without the approval of the Governor-General. It is worthy of note that in effecting economies and in providing for the continuation of the machinery of the government, no serious consideration was given to any suggestion that deficits should be met by borrowing, but that necessary steps were courageously taken with a clear sight of the basic needs of the situation.

The land tax, which forms the main source of support of the provincial governments, became an intolerable burden to the landowners consequent upon the material depreciation in the values of produce, so that a large percentage of

* Abstract from the Report of the Governor-General of the Philippine Islands 1932-33.

this tax remained unpaid and it was evident that it was physically impossible for them to meet their normal payments. In the circumstances, enforcement of payment was out of the question and it was decided that payments should be adjusted to the ability to pay and towards this end a far-reaching campaign for collection was instituted with remarkable success. In this connexion, a reassessment of land values was urged to adjust them to present productive values and all provinces were pressed to reorganise and reduce their government expenses to conform with decreased revenues.

A law was passed which, *inter alia*, authorised provincial treasures to prescribe and publish periods specially fixed for the collection of taxes to suit the seasonal differences which affected the harvesting dates of the various crops found in the Islands and to make collections in semi-annual instalments.

In addition, this law empowered municipal councils to levy special assessment against any property to which special benefits accrued as a result of public works.

The Report draws attention to the importance of the small farmer in the Philippines and the necessity for his assistance in any possible way. Towards this end, efforts are being made to promote diversification of crops, to encourage poultry and pig-raising, and the growing of vegetables for home consumption. On the other hand, increases should be envisaged in the tariffs on such articles as can and should be produced on the small farms, provision should be made for the reassessment of land values, to render reasonable credit easy and to curb usury. Assistance should firstly be given to small farmers already settled on the land and every effort should be made to encourage further settlement of small-holders.

This is being achieved by amplification and development of agricultural extension work to the limits of the means available, including lectures, demonstration caravans, model houses and agricultural fairs which encourage competition and in which demonstrations of improved varieties of plants or implements are useful towards broadening the scope of agriculture.

In the fairs, social aspects are stressed and amusements are provided while all prizes are of a practical nature—such as a plough, or a couple of pigs—which are appreciated by the small farmer more than the certificate which is commonly bestowed; free seeds for crops especially adapted to localities are also distributed at fairs and from caravans. Usury is rigorously opposed, not only by the extension of credit on reasonable terms, but by the punishment of usurers.

The Philippine National Bank aims at the extension of credit of the small farmer by granting loans up to P.500 secured by standing crops, or by mortgage of real estate. It also envisages the formation of rural credit societies and the organisation of rural banks. The tenant farmer in the rice-growing areas is protected by a law which provides for written contracts between landlord and

tenant in a dialect known to both, which constitutes a notable advance against one of the most potent abuses in regions where payment is in kind rather than in money.

With a view to increasing the number of small farmers, systematic effort is directed towards the survey of suitable large tracts of land, towards dissemination of information regarding such areas in the regions where land hunger is most patent, and towards the prevention of land speculation by earmarking all public lands contiguous to projected highways for occupation by small-holders only.

Furthermore, the curriculum of the agricultural schools is being remodelled so that the last few years of study will be upon farms, and large tracts of land are being exclusively reserved for demarcation of homesteads for graduates. It is intended that each class will go as a colony to a selected district and settle there, a resident teacher being responsible for the instruction of the boys while they are developing and improving land which will become their own property on graduation.

Although the agricultural population forms the main section of the people, the needs of industrial workers are also to be borne in mind, especially as this class of the community is steadily increasing in number. For this class, laws have been passed regulating the operation of private employment agencies, binding contractors to guarantee the payment of labourers, freeing labourers of any compulsion to purchase food, raiment or any other commodities by any tokens other than local legal tender currency and forbidding the payment of wages except in such currency.

Other laws permit municipal authorities to make free distribution of medicines to labourers under their jurisdiction, to give preferential claims to wage earners, to allow free medical treatment to labourers in establishments where over 30 are employed, to provide for preferential claims to such classes as labourers and domestic servants in cases of insolvency and to make provision for mediation and arbitration between landlords and tenants and between employers and employees.

The Philippines abound in natural resources, the population is intelligent and industrious yet economic development has been faulty in three directions.

Firstly, many agricultural products which can be grown or produced in the Islands are imported, such as pork, coffee, tobacco, fish, eggs, onions, cotton beans and cocoa, the total value of these imports totalling some P. 40,000,000.

Secondly, though raw materials and skilled artisans are numerous, little or no manufacture is in progress whereas commodities such as cotton goods, soap, starch and sacking are imported annually in large quantities.

Thirdly, there is little flexibility of mind so that paths beaten in the past are still closely followed despite changed conditions. Rice cultivation, for instance, only occupies the land for half the year, whereas much rice land could

be used throughout the year by diversification of crops which would materially increase the farmer's annual income as well as supply products for his own consumption.

Towards improving existing conditions the tariff rates, which had altered very little since 1909 despite highly changed times, were investigated and the need for increases became evident, the demand for increased tariffs coming equally from producers, exporters and American manufacturers.

Accordingly, the Legislature amended the general customs policy so that foreign invoice values should be converted into Philippine currency in assessing *ad valorem* duties so as to prevent dumping of foreign goods and in order to dispense with the limit of 100 per cent. in *ad valorem* duties.

In addition, measures were enacted to effect specific upward revision of the tariffs in regard to meat, peanut oil, eggs, footwear and some 70 other products, while tariffs on textiles, steel, wheat flour and motor car tyres were eliminated.

The economic situation in the Philippines appears sound superficially, but its high dependence on the sugar trade with the United States (to which it exported P. 122,000,000 worth of sugar and sugar products in 1932) renders it precarious. This position is aggravated by the possibility of the islands becoming an independent nation and thus losing the advantage of free trade with the United States, since economically, sugar production in the Philippines cannot compare with Java where already over-production exists to the extent of 4,000,000 tons. Thus, it becomes increasingly evident that the islands must devote immediate attention to diversifying products and to developing new markets, especially in China. In endeavours to broaden the base of the economic structure of the Philippines, careful attention is directed towards developing existing industries and creating new ones indicated by undeveloped natural resources or special aptitude on the part of the people, such as is shown by the fishing industry, in regard to which special administration is being established in order to foster it from every aspect.

Similarly, the Manila hemp industry is suffering from competition and low prices and efforts are to be made to find new markets and, if feasible, to utilise the material in manufacture of sacking and other products within the country. Although the natural resources of the country are abundant, they are not inexhaustible and efforts are to be directed against waste and towards the full development of the resources at hand, such as is manifested in the homestead policy under which small rather than large farms are advocated. In like fashion, all water power is declared as part of the public domain and measures have been taken to prohibit the use of poison and dynamite in fishing in the furtherance of conservation of resources.

With regard to education, while much progress has been achieved in the past 30 years, it has been a failure in that ever increasing numbers of youths

have been trained for clerical positions which do not now exist, with the result that graduates have become liabilities rather than assets on the State.

Accordingly, every effort must be made to render school curricula practical so that the young may become capable of maintaining the agriculture and other industries of the country.

It is hoped that this end will be achieved by community assemblies held monthly for adults in the schools and that the local teacher or some Departmental Officer should lecture at each assembly.

A large number of practical lectures is being prepared and translated into the ten Philippine dialects for distribution through the teachers.

The lectures embrace all kinds of subjects and are couched in simple terms, understandable to all, and often accompanied by diagrams or models, while a question period is specified at each assembly.

[The drastic changes in the economic life of the people, the national economic situation and the efforts being made to meet the demands of the times in the Philippines, form a striking analogy with present conditions in Malaya where the people are now being educated to tariffs, particularly on imported food-stuffs which could be grown within the country and where the importance of the peasantry is now being stressed by propaganda work, land settlement, and better methods of manufacturing and marketing their produce while every opportunity for fostering existing industries and initiating new ones is being taken.—*H.W.J.*]

Reviews.

Cooperation in the Hawaiian Pineapple Business.

By Royal N. Chapman. American Council Institute of Pacific Relations, New York 1933. 15 pp.

This pamphlet describes the history and development of co-operation among the pineapple producers of Hawaii.

The Hawaiian canned pineapple industry, which has been in existence for less than forty years, is now controlled and operated by a small group who are both growers and canners, and who produce roughly eighty-five per cent. of the world's supply of this product.

The reader is reminded that of a total world consumption of about fourteen and a half million cases of canned pineapples, Hawaiian production is over twelve and a half million cases and Malaya over one and a half million. The other exporting countries are Formosa, South Africa and Queensland.

Although co-operation in the Hawaiian industry has now been developed to a high state of efficiency, it is pointed out that this result has not been easily brought about. On the contrary, it has been embraced only when the alternative has seemed to be leading to serious financial loss.

Co-operation amongst those engaged in the production of Hawaiian canned pineapples has varied from time to time and includes advertising; the support of research work in connection with the growing, improvement and protection of pineapples; the allotment of space on boats; and, in cooperation with the Hawaiian Sugar Planters' Association, the importation of labour.

The idea of co-operation was first mooted in 1904 and concrete proposals made in the following year. The industry at that time, however, could come to no agreement on the subject. Such co-operation as was proposed would, it is claimed, have prevented the excessive canning capacity which now exists, thus resulting in a great saving of capital; it would also have resulted in a standardization of the product. The fact that one company controlled forty-seven per cent. of the pack and was not interested in the co-operative proposals militated against the adoption of the plans for co-operation.

The advantage of co-operative advertising has twice been demonstrated in the history of the Hawaiian pineapple industry. In both cases, be it noted, the scheme has been forced on the packers by the economic conditions.

Early in 1909, the industry found itself with about seventy per cent. of the entire pack of the previous year still on hand. Faced with this position and with the low price of pineapples, the industry united and with the sum of \$50,000 (gold) with which to finance a co-operative advertising campaign, succeeded in disposing of its pack by the middle of June of the same year.

A somewhat similar situation arose in 1912. In this instance the Association of Hawaiian Pineapple Packers was formed and a cess of five cents per

case on the year's pack was imposed to finance the advertising campaign. Assessments have been made more or less continuously from that time for the purpose of advertising.

The need for research work was first evinced in 1914 when the Pineapple Association arranged with the Hawaiian Sugar Planters' Association for a certain amount of work to be done on pineapple problems. In 1922 a further step was taken towards extending the pineapple research work by the lease of 100 acres of land for experimental purposes. Two years later, the research work was withdrawn from the Experiment Station of the Hawaiian Sugar Planters' Association and organised by the University of Hawaii with the support of an assessment on the pack of pineapples—which amounted to a little over one cent a case on the pack. The budget for the work in that year was \$96,537; in 1933 the sum of \$161,818 was estimated for this work.

The incentive for the development of the research work is stated in the following words:—

“ It is interesting that the initiation of the work with the H.S.P.A. in 1914, the leasing of one hundred acres at Wahiawa for experiment work at the end of 1922, and the setting up of the independent research work at the University of Hawaii from 1924 to 1926 coincided with the three reductions in pack increase in the history of the industry.* It was economic necessity rather than any logical plan or forethought that brought about these three important steps in the history of the industry's cooperative activities.”

The establishment of the Experimental Station led to a very much larger potential production of pineapples owing to the introduction of the method of mass planting, whereby the number of plants per acre was increased from a range of 8,000 to 10,000 to one of 12,000 to 20,000, with a corresponding increase in the yield of fruit; and to an expansion into the drier areas following upon a demonstration of the ability of the pineapple to grow under conditions of low rainfall.

Co-operation with the object of obtaining better shipping facilities is a further instance of necessity compelling co-operation. A situation of difficulty arose in 1917 in which, owing to the Great War, the industry was unable to obtain sufficient material for putting up the pack of pineapples. Eventually the packers, in co-operation with shipping companies, effected arrangements whereby they were assured of the supply of all necessary materials to Hawaii and for the transport of the pineapples to the Coast.

The history of how the Hawaiian canned pineapple industry has fared in the present world depression is given in some detail. The acreage under pineapples rapidly increased between 1928 and 1930 and the satisfactory means of controlling wilt, which was announced at about this time, greatly increased the estimated pack in the coming years. The position became so serious that in September 1930 most of the packers agreed to stop short of the end of the season. Consequently, the pack was less than the 13,000,000 cases for which there was fruit in the field. The estimated pack for the following year was

*The reduction in packs on these three occasions are ascribed respectively to wilt, the withdrawal from one area because the production of pineapples there was no longer possible, and pineapple yellow spot.

16,000,000 cases. "With a world depression in full force, and the carryover at the beginning of 1931 equal to sixty-one per cent. of the pack of the year before, the Hawaiian pineapple industry was again faced with conditions similar to those experienced in 1907 to 1909".

In the face of economic depression and with the increased pack, advertising failed to maintain sales; the price of pineapples was cut to below cost of production in spite of which the situation became worse.

It became evident that once again the industry must unite to save itself. Seven pineapples companies were involved and negotiations ensued having for their object an agreement for the reduction of the pack. It was agreed that at least for a period of years the Hawaiian pack should not exceed 10,000,000 cases per annum. A new body—The Pineapple Producers' Cooperative Association—was formed and an advertising campaign organised to spend a million dollars, the cost to be met by an assessment on a basis. It is too early to judge the degree of success of this Association. It is attempting at present, to pool the pineapples as canned and to market them co-operatively.

The pamphlet refers to the situation in the Malayan industry and the need of closer co-operation of canners in order that the industry may be reorganised and established on a sounder basis.

Assuming that such co-operation in the Malayan industry materialises, the author visualises "the formation of an international trade agreement whereby potential sales areas of the world would be allocated, as has been done with certain other industries, thus eliminating competition between co-operatives."

The problems that have arisen in the Hawaiian industry are parallel with those met with in Malaya. The difference is that Hawaii appears to have gone a long way along the road which leads to a permanent solution of the most difficult problems which time and again confront the industry, and which are common to both Hawaii and Malaya. The latter country, therefore, will lose nothing by a very close study of the Hawaiian experience and the manner in which that country hopes to solve its difficulties.

D. H. G.

The West Indian Fruit and Vegetable Industries.

In recent years, considerable developments have taken place in the transport and marketing of fresh fruits. It has been rendered possible primarily by the advance in knowledge of the most suitable temperature conditions at which particular fruits should be maintained during transit. These investigations, undertaken by various low-temperature stations and assisted by the interested co-operation of transport companies—by land and sea—have provided the fruit growers with a wider market. The consumer is now offered a very much wider range of fruits than formerly and in better condition. Furthermore,

the consumer finds that whereas formerly his favourite fruit was procurable for but a short season, nowadays the seasons are lengthened, while many fruits are now procurable throughout the year.

The development of markets has necessitated new series of investigations in many directions. The grading of fruit is no longer sufficient; research is now concerned with the behaviour of varieties of fruit in storage, desirable qualities of fruit from the point of view of packing, ripening quality of fruit and the study of the market with the object of distributing production to ensure continuity of supplies.

This subject and the problems connected with it, is again brought to the fore by the recent publication of the Report, Recommendations and Proceedings of the West Indian Inter-Colonial Fruit and Vegetable Conference, Jamaica, 1933.

Its recommendations, which are succinct, adequately cover the various aspects of the subject. Allusion may be made to certain of these recommendations which may be of particular interest locally.

With regard to limes and lemons; in view of the fact that the lime industry has lost its market for citric acid and to a certain extent, for raw juice and that the demand for its essential oil and fresh fruit is restricted, it is recommended that each Government should discourage further planting. Also growers should be advised of the present position and the desirability of restriction in the interests of the industry. The lemon industry is also overstocked, and producers should be advised accordingly.

Regarding pineapples, the recommendations are stated as follows:—

“There does not appear to be any immediate possibility of reviving the former export industry in fresh pineapples from the West Indies, but market demands would appear to warrant trial shipments to the United Kingdom and Canada, on a small scale under the supervision of the Department of Agriculture. Suitability of the different varieties to the export trade also requires investigation.

“Caution appears necessary in any consideration of extension of planting on a commercial sale, either for the export of fresh fruit as for production for canning.

“The existing supplies of the canned product are greatly in excess of market requirements, and this condition may be expected to continue for some time. The results of the recently established cannery in British Guiana should be awaited before further commercial canneries are considered in any other West Indian Colony.”

An interesting recommendation is that a clearing-house be established for the collection, co-ordination and circulation of information gathered on the various aspects of production and marketing of fruit and vegetables of the West Indies. Bearing on the same subject, it is suggested that Government Departments of Agriculture or Government Marketing Agencies should be responsible for investigation and marketing trials on crops for which an export

market appears to exist and that a Marketing Intelligence Officer for the West Indies Colonies should be appointed to work in Canada. By this appointment the Colonies would be able to maintain direct contact with their markets.

Two West Indian Fruit and Vegetable Councils are advocated with the object of co-ordinating the production and marking of fruits and vegetables from the various Colonies. They would be in close touch with the producers on the one hand and with the markets on the other hand.

The value of advertising is recognised and the suggestion is made that the sum of £2,000 per annum be raised by imposing a cess on produce to be paid by the growers.

Standardization of products is insisted upon by means of grading, packing and marking. The Report states —

“It is essential to the development and success of the Fruit and Vegetable industries in the West Indian Colonies that only high grade products should be exported, that only varieties approved by competent advisers should be grown and that the products exported should be as uniform as possible in respect of quality, grading, packing and marking.”

“These objects can best be achieved by preventing by Law the export of products below recognised market standards.”

D. H. G.

The Butterflies of the Malay Peninsula.

By A. S. Corbet and H. M. Pendlebury. 252 pp. Illustrated. Published by Kyle Palmer & Co., Ltd., Kuala Lumpur 1934. \$4.50.

The publication of this reasonably priced and non-technical book has filled a long felt want for those who are interested in the butterfly fauna of the Malay Peninsula.

Experienced Lepidopterists, and also those who are sometimes rather uncharitably termed “mere collectors” will be assisted in their work, in no small degree, if advantage is taken of this volume, which comprises, in addition to well drawn up descriptions of some eight hundred species, chapters on the structure, characteristics, life histories, classification, geographical distribution, methods of capture and preservation, on mimetic resemblance, heredity and on the bibliography.

The book is illustrated by two coloured plates, thirty-four text figures, fourteen photographic plates shewing two hundred and thirteen species, and by two maps.

In view of the fact that most works on tropical butterflies are expensive and therefore not within the means of many people, the publication of this useful volume is welcomed and the authors are to be congratulated on their achievement.

N. C. E. M.

Departmental.

FROM THE DISTRICTS.

The Weather.

Weather conditions varied considerably in different parts of the Peninsula. In Kedah, Penang, Province Wellesley and north west Krian, they were warm and dry with occasional showers. In Perak, heavy showers and high winds resulted in a rainfall above average in most Districts. In Pahang and Selangor, warm dry weather was interrupted by fairly frequent thunderstorms and high winds. In Negri Sembilan, Malacca and Johore, warm dry weather prevailed. In Kelantan and in Singapore Island, the first half of the month was cool and showery, while the second half was warm and dry.

Remarks on Crops.

Rubber.—There was a further rise in the average price of rubber during the month. The highest and lowest prices in dollars and cents per picul recorded for rubber from small holdings were:—Smoked Sheet \$14.00 to \$22.00; Unsmoked Sheet \$11.00 to \$20.50; Scrap \$3.50 to \$9.50. The average Singapore prices for these grades were respectively \$20, \$18.50 and \$8.50 as compared with \$19.00, \$17.50 and \$6.00 in January. Penang prices for Unsmoked Sheet ranged from \$15.00 to \$20.50 as compared with \$13.50 to \$16.50 in January.

Wintering was general throughout the month with the usual resultant lower yield of rubber. This factor and the enhanced price of rubber led to more severe tapping and to further extension of the tapped area. For example, a number of holdings in Kedah were observed to be tapped twice daily; in Penang Island the trees were tapped in the early morning by lamp-light; while in Johore, tapping was commenced on a considerable area of holdings containing young rubber trees which had never previously been tapped.

With the rise in price, neglected holdings were cleared and weeded and approved disinfectants were used more freely for the treatment of mouldy rot disease, which also received a check from the dryer weather conditions. Leaf mildew (*Oidium heveae*) was not in evidence, being reported from only one estate in the Negri Sembilan.

In Pahang, attempts to persuade the small-holders to combine and sell their rubber in bulk have begun to meet with success and to result in better prices. A movement is on foot to produce a better quality of smoked sheet by the use of smoke houses worked on a co-operative basis.

In Kelantan, a marked advance was made in the improvement of small-holders' rubber. The original small factory at Pulai Chondong is now used by 54 people and 6 other such factories are being erected on other localities. The sheet prepared sold for \$17 per picul, while the wet and dirty lump rubber usually made in this State only realised \$9 per picul.

Padi.—The price of padi at the Government Rice Mill, Bagan Serai, was reduced to \$1.40 per picul, the roadside price in Krian District being \$1.20 per picul. In Kedah and Province Wellesley, the price was even lower, being approximately 95 cents to \$1.20 per picul. In other parts of the country, the price ranged from 5 to 12 cents per gantang in the villages, thus showing little change from that obtaining in January.

In Kedah and Malacca, the padi harvest was nearing completion at the end of the month. In the former, yields were on the whole very good and in the latter fairly good. In the Negri Sembilan, the harvest was finished except in Kuala Pilah District. Work was well advanced in Province Wellesley where good crops were recorded. In Krian, in spite of the handicaps of labour shortage and wet weather in the southern areas, good progress was made and an excellent crop was expected. Mention is made of yields varying from 600 to 750 gantangs per acre from certain long-term strains of padi, such as Seraup 36 and 48, in the best deep soil areas. Elsewhere in Perak, harvest was in progress. In Kelantan, a good crop of dry padi was reaped, but harvesting of the rather poor wet padi crop had not commenced.

The pure strain padi have proved their value in several localities. In Kedah, in view of the large supplies of these strains now available and of the excellent results so far obtained by owners who have planted them, a campaign for the wide-spread distribution of the seed is being undertaken. In several localities in Pahang these strains have proved considerably superior to the local varieties of padi, while in northern Johore there has been a spontaneous demand for pure strains from cultivators, which has led to the supply of 531 gantangs of seed from the Pulau Gadong Station in Malacca.

In Northern and Central Johore, the work of preparation for the coming season's crop is commencing and uniform dates for the various operations have been arranged.

Coconuts and Copra.—The price of copra from small holdings remained very low, being \$2.30 per picul in Singapore and \$2.60 to \$2.80 in Penang. Elsewhere it varied according to quality from \$1.30 to \$2.90 per picul, except that in one locality in Kedah a price as high as \$4 per picul was recorded.

In most copra-producing areas, nut prices were correspondingly low, except in the coastal Districts of Selangor, parts of the west coast of Johore and the District of Temerloh in Pahang, where a temporary shortage of nuts, or competition between Malay and Chinese copra makers, or these two factors combined, resulted in a higher price for nuts, which in some cases was such that copra could only be made from them at a loss. Nut prices in Malacca rose slightly owing to considerable exports to the Negri Sembilan.

Padi harvest has somewhat suspended improved copra production and the erection of new kilns in Province Wellesley and Krian, but interest has been maintained and arrangements have been made to commence work as soon as the harvest is finished. In Lower Perak and Johore, progress has been made.

In the latter State, work on the construction of several kilns in Muar and Batu Pahat Districts was commenced and marketing channels received attention.

It is in such difficult times as are now being experienced that the small increase in income obtainable from the preparation of good copra, as compared with that obtainable from the sale of nuts, is of the most importance to owners of coconut holdings, since it may just make the difference between a sufficient and an insufficient supply of food.

Pineapples.—Activity in the pineapple industry increased during the month, but fruit supplies in Singapore were limited so that the three factories operating produced but a small output. In Johore, six factories were working daily, except for five days of the Chinese New Year holiday. Prices for fruits in Singapore were, first quality \$3.20, second quality \$1.80 per hundred; corresponding prices in Johore ranged from \$2.40 to \$3.60 and from \$1.80 to \$2.60.

A scheme for selection of pineapples, with a view to improving the type of fruit, was drawn up and work in accordance with this scheme was commenced both on the Pineapple Experiment Station and on privately-owned pineapple areas in Singapore Island.

Fruit.—In Krian, Malacca and Johore, mango trees were flowering well, while in the latter State a few duku trees were fruiting. In Penang Island, there was a good trade in water-melons, especially during the Chinese New Year, prices realised being 10 to 15 cents each. In Malacca, where the cultivation of this fruit by Malays was extending, the fruit were realising 25 to 40 cents each.

Vegetables.—In Malacca, vegetables grown on padi land cropped with short-term varieties were beginning to find their way into the market. Chillies were being produced in excess of requirements; the balance were sundried and mixed with imported chillies, the price for which has recently shown a rise. Damage to market gardens in Johore by floods during January caused a shortage of supplies of vegetables in that State, while in Singapore Island gardeners in areas which were not damaged by floods during January have benefitted considerably from the rise in price due to reduction of supplies. In Kedah, tomato planting by Malays for sale at the Weekly Fairs was noted in Baling District. In the dry season and in situations near a supply of water, tomato-growing is expected to develop into a successful minor industry in this State.

Tobacco.—Prices for sundried tobacco leaves ranged from \$14 to \$35 per picul for first quality, except in parts of Johore where prices as high as \$60 per picul were obtained. In Kedah, about 26 acres of tobacco were planted. In Province Wellesley and Pahang, low prices have reduced interest in this crop, although some 21 piculs of cured leaf were sold in the Province. In Singapore Island, however, interest continues with a price of \$35 per picul for cured leaf.

Coffee.—Prices for locally grown Liberian and Robusta coffee have varied from \$13 to \$28 per picul, the highest prices being obtained in Kedah. Interest

in coffee cultivation is extending in Pahang, where supplies of seedlings for sale are being maintained at the Agricultural Stations. In Segamat District of Johore, areas of land have recently been alienated to Chinese for the cultivation of coffee as a sole crop.

Agricultural Stations.

Trials of the vegetative propagation of a number of different fruit trees by means of the etiolation method* are being conducted at several of the Agricultural Stations. Rooted shoots of rambutan and Jack fruit were obtained by this method at Bukit Mertajam Station and rooted shoots of rambutan and pulasan at the Pineapple Experiment Station, Singapore. At the latter, grafts of mango, pulasan, rambutan and avocado pear were obtained by approach grafting.

At Bukit Mertajam Station, experiments with groundnuts showed that yields from rows which received a dressing of lime at the rate of 1 ton per acre in addition to cattle manure gave approximately twice the yield obtained from the rows that received the same quantity of cattle manure alone. This result supports previous experiments on Castleton Estate in 1916.†

The imported fowls at the Government Experiment Station, Tanah Rata, continued to lay well. The number of eggs obtained varied according to breed from an average of 16 to an average of 22 per pullet for the month. Of these 53 per cent. were over 2 ozs. each in weight and 47 per cent. were between 1½ and 2 ozs. each.

Padi Test Plots.

Harvest was completed at Titi Serong Padi Station and on all Test and Multiplication Plots in Krian, except the Briaiah Test Plot. Yields were good. Seraup 36 and 48 and Siam 76 were outstanding at the Kuala Kurau Plot. At the Temerloh Plot in Pahang, Nachin 27 doubled its yield as compared with last year's crop, but for some reason F.S. 875 showed a much decreased yield of 448 as compared with 560 gantangs per acre in the previous season. At the Rembau Plot in the Negri Sembilan, some of the pure strains ripened very unevenly, each variety having a maturation period varying by some 50 days, thus Nachin 66 gave a period of 238—291 days and Seraup 48 272—322 days. At the Pulau Gadong Station in Malacca, some selections of Padi Milek from Pahang gave very promising yields which were as good as, or better than, the local Nachin and Siam selections, while the straw of the Milek strains was much stronger.

At Dong Test Plot in Pahang, plots of short-season varieties of padi have been planted to test the possibility of obtaining two crops in a year. At Pulau Gadong Station, one acre was planted for the same purpose with the short-term padi Radin Siak.

* *Malayan Agricultural Journal*, February, 1934, page 58.

† *Malayan Agricultural Bulletin*, Vol. IV, page 376.

Beds of padi straw for the cultivation of the mushroom, *Volvaria volvaceae*, were established at Telok Chengai, Rembau, Pulau Gadong and Sungei Udang Stations with spawn from Bukit Merah Station. A bed in the office compound in Kedah started to produce mushrooms 26 days after the spawn was built into it.

Rural Lecture Caravan.

The Caravan visited Lower Perak from February 5th. to 18th. when lectures and demonstrations on the production of improved copra were given. Audiences evinced much interest in the display of models of kilns and samples of copra illustrating the effect of various faults in harvesting and preparation.

From February 20th. to 28th. a visit was paid to Sabak Bernam sub-District, the subjects dealt with being copra production, padi cultivation and rat control in padi fields.

Copra Course.

A course of instruction on the erection of improved copra kilns and the preparation and marketing of improved copra was given at the Coconut Experiment Station Klang to 13 Malay Agricultural Officers and Headmen from Kelantan, Pahang, Malacca, Province Wellesley and Singapore from February 20th. to 3rd. All those attending exhibited a lively interest in the information given.

Malayan Padi Competition.

Judging of entries at six local padi shows in the Alor Gajah District of Malacca was carried out during the month in accordance with the new scheme for the Malayan Padi Competition described in the *Malayan Agricultural Journal* for December, 1933, page 682.

DEPARTMENTAL NOTES.

Appointment to Federal Council.

With the approval of His Majesty the King, His Excellency the High Commissioner has been pleased to appoint the Director of Agriculture, Straits Settlements and Federated Malay States, to be a member of the Federal Council with effect from the 8th. January, 1934, inclusive.

Tours and Visits of the Director.

The Director of Agriculture visited Singapore on February 14th. and 15th. for the purpose of attending two emergency meetings prior to the departure of His Excellency the Governor. He also inspected the Pineapple Station at Lim Chu Kang.

On February 16th. he proceeded to Pahang and met the British Resident, Pahang, at Temerloh for the purpose of discussing questions in connection with the proposed Government rice mill at that point.

Subsequently, he toured the State of Pahang and inspected all official agricultural undertakings and discussed departmental questions with the State Agricultural Officer and other officers. He returned to Kuala Lumpur on February 26th.

Advisory Committee for the School of Agriculture.

A meeting of the Advisory Committee for the School of Agriculture, Malaya, was held on February 8th.

It was agreed that the fees of students domiciled outside the Straits Settlements and Federated Malay States be fixed at \$420 per annum for the Two Years Course and \$210 for the One Year Course.

The Straits Settlements and the Federated Malay States Governments have offered a number of Major and Minor Agricultural Scholarships for each year, the precise number of which will be determined from year to year. Six scholarships of each grade were awarded for the F.M.S. in 1933 and the same number is offered this year, as against three of each for the Colony. The latter scholarships are not confined to Malays.

The Chairman stated that the number of applications for admission to the School next May, particularly as Private Students, was already extremely satisfactory. The proportion of Chinese amongst present candidates is large.

The Committee expressed its satisfaction with the School's progress during the past year, and with its immediate prospects.

Leave.

Mr. T. D. Marsh, Assistant Agriculturist, has been granted full-pay leave for 8 months and 8 days with effect from 17th. February, 1934.

Statistical.

MARKET PRICES.

February 1934.

Rubber.—The market price of rubber has remained steady during the month, opening at 16 cents per lb. for Spot loose in Singapore and closing at $16\frac{1}{8}$ cents per lb. The average price for the month was $16\frac{1}{4}$ cents per lb. in Singapore, $4\frac{7}{8}$ pence in London and $10\frac{1}{4}$ cents Gold in New York, as compared with $14\frac{1}{2}$ cents, $4\frac{13}{32}$ pence and $9\frac{1}{8}$ cents Gold respectively in January.

Weekly prices during February for small-holders' rubber at Kuala Pilah, Negri Sembilan; Kuala Kangsar, Perak, and Batu Pahat, Johore, were as shewn in the following table:—

Grades	VALUE PER PICUL (dollars)									
	Kuala Pilah, Negri Sembilan.		Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	15.2.34	22.2.34	31.1.34	14.2.34	21.2.34	28.2.34	7.2.34	12.2.34	21.2.34	28.2.34
Rubber *	17.00	17.26	17.98	18.49	17.23	18.52	16.48	18.75	19.11	19.60
Scrap		5.00								

Palm Oil.—The course of the market Liverpool/Continent during February on a basis of 5 per cent. f.f.a., c.i.f. was as follows:—February 7th. £14.10.0 per ton net, February 21st. £14.10.0 per ton net, and February 28th. £14.15.0 per ton net.

Prices in the U.S.A. landed weight per pound in bulk c.i.f. New York/Philadelphia were 2.62 cents Gold on the 7th. February, 2.60 cents Gold on the 21st. February, and 2.75 cents Gold on the 28th. February.

* Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

The price of palm kernels Fair Average Malayan Quality c.i.f. landed weight on the Continent was shillings 7/3 per cwt. on February 7th., shillings 7/3 per cwt. on February 21st., and shillings 7/1½ per cwt. on February 28th.

Copra.—The price of copra remained steady during February. The highest Singapore price for Sundried during the month was \$3.05 per picul, and the lowest price \$2.95 per picul, the average price per picul being \$3 as compared with \$2.94 during January. The mixed quality averaged \$2.40 per picul as compared with \$2.29 in January.

Coffee.—The price at Singapore for Sourabaya coffee increased considerably; prices ranged according to grade, from \$18.50 to \$21.50. Palembang coffee averaged \$17.19 per picul during the month, being quoted at \$16.50 on the 1st. and \$18 on the 23rd; the average figure for January was \$13.12.

Arecanuts.—Palembangs averaged \$3.73 per picul as compared with \$2.92 in January, the rise in price being once again very considerable. The range of Singapore prices for other grades was Red Whole \$3.50 to \$5.50 per picul and Sliced \$8 to \$12 per picul.

There were no stocks of Bila Whole, Splits or Kelantan.

Rice.—The average wholesale price of Siam No. 2 ordinary rice per picul in Singapore in January 1934 was \$2.91, as compared with \$3.18 in December 1933; the average price for the year 1933 was \$3.53. No. 1 Rangoon rice averaged \$2.72 per picul in January, as compared with \$3.11 in December 1933 and \$3.04 for the year 1933. Saigon No. 1 (long grain) averaged \$2.65 per picul. The average price of this rice in the year 1933 was \$3.32 per picul.

Tea.—During January, the average price quoted in London for Malayan tea was shillings 1/2.74. Average prices during January for tea consignments from other countries were as follows:—Ceylon shillings 1/3.97; Java, shillings 1/0.23; Indian Northern, shillings 1/2.89 and Indian Southern, shillings 1/2.67.

Gambier.—The price of Block gambier remained steady during February, averaging \$3.88 per picul, Cube No. 1 averaged \$6.38. Corresponding figures for January were \$3.85 and \$6.35 respectively.

Pineapples.—There was a further slight increase in value during February, the average Singapore price per case being as follows:—Cubes \$3.24, Sliced Flat \$3.06 and Sliced Tall \$3.19, as compared with \$3.17, \$3.05 and \$3.13 respectively during January.

Tapioca.—The price of Flake Fair averaged \$5.11 per picul as compared with \$4.85 in January. Pearl Seed averaged \$5.88 per picul and Pearl Medium \$6.38 per picul, both slight increases on the average prices in January, namely, \$5.60 and \$6 respectively.

Sago.—Pearl-Small Fair decreased slightly in price during February, averaging \$3.76 per picul for the month; the average price was \$3.94 in January. Flour-Sarawak Fair averaged \$1.95 per picul as compared with the January average of \$1.92 per picul.

Mace.—Prices were nominal during February, the average for the month for Siouw being \$65 per picul and \$40 for Amboina.

Nutmegs.—110's averaged in price during February \$21.25 per picul, as compared with \$20 per picul in January; 80's increased slightly in value, averaging \$24.25 per picul against the figure of \$23.60 per picul in January.

Pepper.—Average Singapore prices during February were as follows:—Singapore Black \$15.50 per picul; Singapore White \$29.12 per picul and Muntok White \$30.50 per picul; the corresponding figures for January were \$15.30, \$30.50 and \$32.60 per picul respectively.

Cloves.—Prices continued steady and nominal as in the previous month; Zanzibar averaged \$35 per picul, and Amboina \$45 per picul.

Tuba Root.—Roots evaluated on the basis of ether extract averaged \$25 per picul in the month, whilst good rotenon-containing roots averaged \$30.50 per picul, being a similar average price to that of January.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co., Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = $133\frac{1}{3}$ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

January 1934.

Malaya.—The gross imports of rice into Malaya during January 1934 amounted to 45,510 tons, as compared with 48,972 tons in January 1933, while exports were 10,655 tons in January of this year as against 14,120 tons in January 1933.

Of the imports during January 1934, 61 per cent. were consigned to Singapore, 10 per cent. to Penang, 6 per cent. to Malacca, 22 per cent. to the Federated Malay States and 1 per cent. to the Unfederated Malay States. Of the total imports, 72 per cent. were from Siam, 20 per cent. from Burma, 7 per cent. from Indo-China and 1 per cent. from other countries.

Of the total exports during January, 77 per cent. were shipped to Netherlands India and 23 per cent. to other countries. The various kinds of rice exported were as follows:—Siam rice 6,490 tons, (61 per cent.) Burma rice 3,398 tons, (32 per cent.) Indo-China rice 536 tons, (5 per cent.) Indian rice (parboiled) 39 tons and local production 192 tons (2 per cent.).

Net imports of rice into Malaya in January 1934 were 34,855 tons as compared with 34,852 tons in January 1933.

India and Burma.—The total foreign exports of rice in December 1933 were 74,000 tons, and the total exports for the year 1933, 1,832,000 tons as compared with 2,075,000 tons in the previous year.

The final forecast of the rice crop in Burma for the season 1933—34, issued on February 15, 1934, gives the area likely to mature as 12,440,300 acres. The exportable surplus of the 1933—34 crop is still estimated at 4,324,000 tons of padi, which is equivalent to 3,200,000 tons of rice and rice products.

Japan.—Formosa. The area under padi (second crop) 1933 was 961,037 acres as compared with 941,108 acres in 1932; production was 620,350 tons in 1933 as compared with 663,000 tons in 1932.

French Indo-China.—Exports of padi into Cholon were 72,000 tons in January 1934, a similar figures to that for January 1933. Exports of rice in January 1934 were 95,000 tons, as against 74,000 tons in January 1933.

Netherlands India. (Java and Madura).—No further information to that published in the Summary for the month of December 1933, is available.

Ceylon.—Imports of rice for the year 1933 amounted to 439,893 tons as compared with 441,952 tons in 1932.

Of these imports, 18 per cent. were from British India, 72 per cent. from Burma, nil from the Straits Settlements and 10 per cent. from other countries.

Europe and America.—Quantities of rice shipped from the East were:—

- (a) To Europe, 1,244,668 tons during the year 1933 as compared to 1,018,236 tons during 1932, an increase of 22 per cent. Of these shipments 46 (52) per cent. were from Burma, 2 (2) per cent. from Japan, 44 (38) per cent. from Saigon, 7 (5) per cent. from Siam, 1 (3) per cent. from Bengal; the figures for 1932 being in brackets.

* Abridged from the Rice Summary for January 1934 compiled by the Department of Statistics, S.S. and F.M.S.

- (b) To the Levant, (Jan. 1 to Dec. 18) 24,078 tons for 1933 and 49,437 tons in 1932, shewing a decrease in 1933 over the same period of previous year of 51 per cent.
- (c) To the West Indies and America (Jan. 1 to Dec. 20) 165,452 tons in 1933, as compared with 126,277 ton in 1932, an increase in 1933 of 31 per cent. over the same period of previous year

MALAYAN AGRICULTURAL EXPORTS JANUARY 1934.

PRODUCT.	Net Export in Tons.		
	Year 1933.	January 1933.	January 1934.
Arecanuts ...	20,756	2,407	3,612
Coconuts, fresh ...	100,609†	7,015†	6,515†
Coconut oil ...	17,568	1,618	1,763
Copra ...	110,543	14,584	9,263
Gambier, all kinds ...	2,560	181	173
Palm kernels ...	1,983	65	160
Palm oil ...	12,101	405	297
Pineapples canned ...	59,582	4,713	4,667
Rubber ...	459,836§	35,822§	41,773§
Sago,—flour ...	7,648	656	1,525
„ —pearl ...	2,646	129	255
„ —raw ...	4,420*	495*	464*
Tapioca,—flake ...	9,881	940	649
„ —flour ...	702*	315	184*
„ —pearl ...	17,297	1,056	1,099
Tuba root ...	569½	4	44½

† hundreds in number.

* net imports.

§ production.

MALAYA RUBBER STATISTICS

ACREAGES OF 'TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING JANUARY, 1934.

STATE OR TERRITORY	ACREAGE OF Tappable Rubber end 1932 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
(1)	(2)							(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,734	1,323	2.9	7,243	16.2	1,016	2.3	8,566	19.1
Dindings	6,969	209	3.0	773	11.1	546	7.8	982	14.1
Malacca	111,780	4,619	4.1	15,944	14.3	6,393	5.7	20,563	18.4
Penang Island	1,635	365	22.3	77	4.7	180	11.0	442	27.0
Singapore Island	28,269	8,621	30.5	4,821	17.0	207	.7	13,442	47.5
Total S.S.	193,387	15,137	7.8	28,858	14.9	8,342	4.3	43,995	22.7
FEDERATED MALAY STATES :—									
Perak	250,951	3,954	1.6	27,919	11.1	14,679	5.8	31,873	12.7
Selangor	308,379	5,033	1.6	36,499	11.8	10,155	3.3	41,532	13.4
Negri Sembilan	228,541	4,763	2.1	20,065	8.7	14,172	6.2	24,828	10.8
Pahang	38,141	5,297	13.9	4,442	11.6	4,859	12.7	9,739	25.5
Total F.M.S.	826,012	19,047	2.3	88,925	10.7	43,865	5.3	107,972	13.0
UNFEDERATED MALAY STATES :—									
Johore	325,747	21,932	6.7	32,499	10.0	23,227	7.1	54,431	16.7
Kedah (a) (b)	114,551	3,595	3.1	9,556	8.3	5,700	5.0	13,151	11.4
Kelantan	21,175	5,749	27.1	2,200	10.4	1,860	8.8	7,949	37.5
Trengganu (c)	4,352	Nil	Nil	1,561	35.9	30	.7	1,561	35.9
Perlis (a) (b)	957	106	11.1	131	13.7	308	32.2	237	24.8
Total U.M.S.	466,782	31,382	6.7	45,947	9.9	31,125	6.7	77,329	16.6
TOTAL MALAYA	1,486,181	65,566	4.4	163,730	11.0	83,332	5.6	229,296	15.4

Notes :—(a) Registered companies only and are rendered quarterly.

(b) The figures quoted for Kedah and Perlis are those for end December 1933, revised figures will be published when available.

(c) Registered Companies only.

(d) Figures for end December 1933, are not yet available.

(e) Estimated: figures not yet available.

MALAYA RUBBER STATISTICS
TABLE I
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERSEX,
FOR THE MONTH OF JANUARY 1934 IN DRY TONS.

Territory	Stocks at beginning of month 1			Production by Estates of less than 100 acres and over:		Imports		Exports including re-exports			Stocks at end of month		
	Ports	Dealers	Estates of 100 acres and over	during the month	January 1934	during the month		during the month	January 1934		Ports	Dealers	Estates of 100 acres and over
						Foreign	From Malay States & Labuan		Foreign	Local			
1													
MALAY STATES :—													
Federated Malay States	2	12,715	12,728	12,341	12,341	Nil	Nil	14,447	8,509	14,447	8,509	12,267	12,309
Johore	...	3,305	3,182	3,244	3,244	Nil	6	1,810	6,104	1,810	6,104	3,362	3,024
Kedah	...	538	2,294	3,126	3,126	Nil	Nil	1,967	3,801	1,231	3,801	406	2,487
Perlis	...	28	15	21	21	Nil	Nil	Nil	65	Nil	65	24	9
Kelantan	...	215	203	190	190	935	935	54	1,009	54	1,009	393	195
Trengganu	...	55	50	200	200	99	99	Nil	299	299	...	55	50
Total Malay States	...	16,856	18,472	19,122	19,122	108	6	17,542	19,787	17,542	19,787	16,507	18,074
STRAITS													
SETTLEMENTS :—													
Malacca	...	2,734	1,293	1,322	1,322	1	1	4,238	4,238	4,238	...	2,649	1,290
Province Wellesley	...	1,067	602	630	630	Nil	Nil	8,133	8,133	8,133	...	1,029	692
Dindings	...	59	154	115	115	19,908	19,908	Nil	Nil	Nil	...	70	139
Penang	...	2,354	5,465	8	20	1,935	1,935	25,346	25,346	25,346	...	2,939	6,236
Singapore	...	5,955	31,110	149	156	14,084	14,084	37,717	37,717	37,717	...	6,159	32,045
Total Straits Settlements	...	8,309	40,435	2,206	2,243	16,020	16,020	19,908	19,908	19,908	...	9,098	42,329
TOTAL MALAYA		8,309	57,291	20,678	21,365	21,365	20,408	55,259	55,259	55,259	19,787	9,098	58,836
													20,281

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province Wellesley	Johore	Kedah
20	21	22	23	24	25	26
DRY RUBBER	3,566	27,381	5,636	3,449	1,335	122
WET RUBBER	3,701	4,664	900	239	2,027	284
TOTAL	12,267	32,045	6,536	3,748	3,362	406

TABLE III
FOREIGN EXPORTS

PORTS	For month	January 1934
Singapore	...	36,726
Penang	...	12,186
Port Swettenham	...	5,551
Malacca	...	796
MALAYA	...	55,259

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January 1934
Malay States	...	40,311
Straits Settlements	...	40,311
MALAYA	...	40,311

- Notes:—* 1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
 2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, i.e., Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [22] tons local consumption during the month — [2] — [3] — [4] — [5] — [9] — [10]. For the Straits Settlements, Columns [9] and [10] represent purchases by dealers from local estates of less than 100 acres, reduced by 15% to terms of dry rubber.
 3. Dealers' stocks in the Federated Malay States are reduced to dry weights as reported by the following fixed ratios: unsmoked sheet, 15; wet sheet, 25; scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
 4. Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month, the foreign exports of the Malay States being domestic production.
 5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 23rd February 1934.

METEOROLOGICAL SUMMARY, MALAYA, JANUARY, 1934.

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LOCALITY	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE					
	Means of			Absolute Extremes		At 1 foot	At 4 feet	Total		Most in a day	Number of days				Total	Daily Mean	Per cent		
	A.	B.	Mean of A and B	Highest	Lowest			Min.	Max.		Precipitation .01 in or more	Precipitation .04 in or more	Thunder-storm	Fog morning obs.				Gale force 8 or more	
	Max.	Min.		°F	°F	°F	°F	°F	in.	mm.	in.								
Railway Hill, Kuala Lumpur, Selangor	87.9	70.8	79.3	92	67	79	73	82.3	83.3	11.08	281.4	3.28	15	10	2	5	147.35	4.75	40
Bukit Jeram, Selangor	85.9	71.0	78.4	89	68	80	73	81.5	83.7	9.33	237.0	3.52	18	17	1		154.75	4.99	41
Sitiawan, Perak	86.9	70.6	78.7	92	63	80	74	82.0	83.3	11.62	295.2	2.86	19	18	3	4	174.00	5.61	48
Temerloh, Pahang	82.9	70.3	76.6	90	66	75	73	80.4	83.4	10.24	260.1	3.23	23	19		5	131.40	4.24	36
Kuala Lipis, Pahang	82.6	69.8	76.2	89	66	75	73	80.2	82.0	16.32	414.5	3.81	22	20	23		120.20	3.83	33
Kuala Pahang, Pahang	81.6	74.5	78.1	84	70	78	77	79.9	81.5	10.71	272.0	2.38	19	19			144.60	4.66	39
Mount Faber, Singapore	82.6	70.9	76.7	87	67	71	73	77.7	79.4	18.94	481.1	6.20	18	15	1		117.80	3.80	31
Butterworth, Province Wellesley	87.1	71.5	79.3	91	66	83	74	82.9	84.1	3.84	97.5	0.79	14	14	1	1	210.55	6.79	57
Bukit China, Malacca	83.4	72.1	77.7	87	70	77	74	78.9	80.9	8.06	204.7	1.53	18	15			119.85	3.87	32
Kluang, Johore	81.7	70.8	76.3	88	66	73	74	77.9	79.8	25.36	644.1	5.88	20	17	1	2	117.95	3.80	32
Bukit Lalang, Mersing, Johore	80.7	73.2	76.9	83	67	78	76	78.0	79.3	8.82	224.0	2.28	21	17			138.30	4.46	37
Alor Star, Kedah	87.6	69.8	78.7	91	62	83	73	81.9	83.9	2.94	74.7	1.36	6	4	2	1	208.55	6.73	55
Kota Bahru, Kelantan	83.0	71.4	77.2	85	62	80	76	80.1	82.0	3.46	87.9	0.47	21	17			174.25	5.62	48
Kuala Trengganu, Trengganu	82.3	72.0	77.1	85	63	80	76	79.0	80.6	5.34	135.7	1.53	18	13			132.95	4.29	36
HILL STATIONS.																			
Fraser's Hill, Pahang 4268 ft.	66.9	59.6	63.3	73	56	62	62	68.2	69.7	15.31	388.9	3.23	24	23	20		63.10	2.03	17
Pahang																			
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	69.4	57.1	63.3	73	43	66	62	67.5	68.4	5.52	140.2	1.05	16	14		6	128.15	4.13	35
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	68.5	56.9	62.7	75	51	64	60			5.60	142.3	0.89	18	14		6	129.05	4.16	35